THE

REVENUE REGISTER.

No. 6.] MADRAS:—THURSDAY, JUNE 15, 1876. [VOL. X.

ANNUAL REPORT OF THE SUPER-INTENDENT OF GOVERNMENT FARMS—1874-75.

ONCE more we have the pleasure to acknowledge the receipt of Mr. Robertson's Report. We learn from him that the rainfall registered for the year ending 31st March 1875 exceeded the average rainfall for the past ten years, being 68·98 inches as against 47·23. Unluckily, however, this liberal rainfall was not so distributed over the year as to produce the greatest amount of apparent good; "it was precipitated in heavy showers at very irregular intervals." The October of that year was one that will be long remembered in Madras. It requires no extra exertion of the memory to recall the state of Madras generally on the morning of Sunday the 24th. We remember the roads so drowned with water that in many places they were utterly impassable. Hence we are not astonished to learn that on the 23rd, 24th and 25th October 1874 no less than 13·94 inches of rain were registered! Mr. Robertson wisely adheres to his plan of giving the rainfall in weekly totals, which shows the character of the rainfall better than the old form of monthly totals.

Office work.—We are very glad to find that in this department Mr. Robertson is now ably assisted, and entertains good hopes of overtaking his arrears. We know how very trying it is to feel in the midst of pressing work that a vast amount of office and routine work is lying over, accumulating against that "leisure day" which somehow never comes. Mr. Robertson gives us a few specimen questions to show the nature of the enquiries made of him by people in search of agricultural information. Answering these questions must, we know, take up a great deal of time; yet we have no doubt that Mr. Robertson is more than willing to answer them all, for we know how he desires the increase of agricultural knowledge in Madras.

We are glad to find that the agricultural apprentices have done as well as they could be expected to do under existing arrangements. We are credibly informed that this class is shortly to be broken up, Government having sanctioned the establishment of an Agricultural College, in which both theoretical and practical instruction on agriculture and kindred subjects will be given. The Lecturers have not yet been appointed, but we believe that, as far as at present known, the following list is substantially correct.

SUBJECTS.	LECTURERS.
Veterinary Surgery ...	G. Western, Esq., M. E. C., V. S.
Geology ...	Surgeon-Major King.

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Subjects.	Lecturers.
Chemistry	... Mr. Hamilton.
Botany	... Surgeon Wilkins.
Agriculture	... W. R. Robertson, Esq., M. R. A. C.

C. Benson, Esq., M. R. A. C., will probably have charge of the Sydapet Experimental Farm, and Kasper Schiffmayer, Esq., of the Field and Laboratory experiments. Besides these Lecturers, masters will be appointed to instruct the pupils in Drawing, Languages, and to assist the students generally in getting a good rudimentary knowledge of the subject of the lectures delivered in the institution.

A copy of the prospectus has been kindly sent us; but as our space is full, we must reserve it for our next issue.

We hope that many respectable youths, both East Indian and Native, will now come forward and offer themselves as candidates for agricultural honors. Why should not our lads be as proud to belong to our Madras School of Agriculture as the Graduates of the Royal Agricultural College at Cirencester are of their Alma Mater?

Permanent Improvements.—Among these is a new road nearly a mile long, connecting the roads of the Model and Experimental Farms. Another great improvement is the terracing of some of the sandy undulations so as to save them from the destructive influence of the rain, which formerly used to wash out all their manure, and the finer particles of the sand. Many other minor improvements have been effected. The concrete employed on the Farm is composed of

Lime	... ...	1 part.
Broken bricks	...	5 parts.
Sand	... ...	2 parts.

This mixture Mr. Robertson has found particularly useful for protecting the floor and sides of drains where the fall is great. We are glad to find that snakes, rats, &c., are being kept down on the Farm, and that Mr. Robertson entertains reasonable hopes of exterminating the cobra.

Agriculture in the Madras Presidency.—The facts brought to light by Mr. Robertson under this head are so important that we think it best to reproduce them *in extenso.*

"The following facts throw some light on the real condition of agriculture in this Presidency, regarding which such opposite opinions are held:—

(*a*) *Small proportion of the area of the Presidency now utilized.*—The entire area of the Presidency comprises 138,318 square miles, or $88\frac{1}{2}$ millions of acres; of this, 50,623 square miles consist of permanently assessed properties, Government forests, and hill tracts, leaving 87,695 square miles, or 56,124,800 acres directly under Government. Of this 56 millions of acres, only $27\frac{1}{3}$ millions of acres are under occupation; there is thus nearly 30 millions of acres of Government land altogether unutilized.

(*b*) *Small revenue received from the land in the shape of rent.*—The total area under occupation last year was 27,360,000 acres, and the total rent collected was 34,933,583 Rupees, which is only Rupees 1-4-5, or about 2*s.* 4*d.* per acre.

(*c*) *Low value of the produce of an acre of cultivated land. Dry land.*—During the last official year there were 13,895,331 acres under dry cultivation in the Madras Presidency (excluding South Canara and Malabar, for which I have no figures) that paid rent, amounting to 15,009,850 Rupees, an average of Rupees 1-1-3, or about 2*s.* per acre. With these figures it is very easy to ascertain the average value of the produce of an acre of dry land by means of the formula used in fixing the rent in this Presidency, which is as follows:—From the money value of the estimated outturn, a deduction of one-quarter is made as an allowance for unfavourable seasons; and from this remainder, the cultivation expenses are deducted, and thus the net value of the crop is ascertained, half of which forms the Government rent. Thus it is only necessary, in order to arrive at the net value of an average crop, to multiply by 2 the sum received as rent for one acre, which is Rupees 2-2-6, or 4*s.* To the amount thus obtained, we must add the cultivation expenses which are said by the Settlement Department to average about Rupees 4-10-3. By adding this sum to the net value of the produce already determined, we get Rupees 6-12-9 per acre; to which if we add the one-fourth deducted to provide for unfavourable seasons, we will ascertain the average

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value of the produce raised on one acre of land under dry cultivation in this Presidency, which is Rupees 8-7-11, or about 15*s.* 7*d.* excluding the value of the straw, which is taken as a set-off against the keep of the cattle which forms no charge in the cultivation expenses. *Wet land*—It is not quite so easy to arrive at the average value of the produce of an acre of land under irrigation. There were last year in the Madras Presidency (again excluding South Canara and Malabar) 3,105,622 acres under wet cultivation, for which, in the shape of rent, 16,873,137 Rupees were received, which is Rupees 5-6-11, or about 10*s.* per acre. To ascertain the average value of the produce on one acre of this land, we must proceed in the same way as we did in determining the value of the produce of dry land; thus, twice the amount of the rent represents the net value of the produce which is Rupees 10-13-10, to this we add the cultivation expenses, which are said by the Settlement Department to average about Rupees 7-9-9 per acre, which, added to the net value of the produce, makes Rupees 18-7-7 per acre. In fixing the rent of wet land, the deduction made for unfavourable seasons is only one-sixth; this, added to the figures previously obtained, brings up the total to Rupees 21-8-10, about two pounds sterling as the average value of the produce of an acre of irrigated land, less the value of the straw, which, for the reasons stated when referring to dry crops, is omitted in the calculation.

(*d*) *Small incomes of the Cultivators.*—It is very easy to ascertain the amount of income enjoyed by Cultivators in this Presidency, if the information contained in the previous paragraph is accurate; thus it is only necessary to deduct the annual rent from the value of the produce of an acre of land, and the balance that remains is the income of the Cultivator and his family for their joint labors. If we take for illustration the renter of a holding of 12 acres, 10 acres of dry land, and 2 acres under irrigation, the annual income derived therefrom will be as follows:—

	RS.	A.	P.
10 acres of dry land, the produce of which is valued at Rupees 8-7-11 per acre	84	15	2
2 acres of wet land, the produce of which is valued at Rupees 21-8-10 per acre	43	1	8
	128	0	10
Deduct rent, 10 acres of dry land, at Rupees 1-1-3 per acre, and 2 acres of wet land, at Rupees 5-6-11 per acre.	21	10	4
	106	6	6

From this it would appear that the total income derived from a 12 acre holding to repay the Ryot for the labor of himself and family, and expenses incurred in cultivation throughout a year would be in a favourable year only Rupees 106-6-6, and in an average year, deducting the one-fourth allowed for bad seasons, only Rupees 79-12-11, or about Rupees 6-8-0 per mensem equal to three shillings per week.

(*e*) *Large proportion of occupied land under fallow.*—Of the 27,360,000 acres under occupation, 4,996,000 acres were last year under bare fallow, produced no crop whatever, and paid no rent.

(*f*) *Low type of crops generally grown and the small area under crops that need manure and moderately good cultivation.*—Of the 22,364,000 acres under crops, food grains occupied 18,385,000 acres, of which 26,000 acres only consisted of wheat; this crop is perhaps not so well suited for cultivation in the southern half of the Presidency, as it is for culture in the northern half; but even in the districts peculiarly suited for its cultivation, it occupies but a miserable proportion of the land under food grains; thus:—

District.	* Total Area under Food Grains.	Of which Wheat occupies
		ACRES.
Salem	1,432,000	1,000
Nilgiris	34,000	3,000
Coimbatore ...	2,089,000	3,000
Kurnool	1,700,000	8,000
Bellary	2,909,000	6,000
Cuddapah	1,527,000	3,000
Kistna	1,657,000	2,000

The area under wheat might be very largely increased especially in the districts to which I have just referred. Wheat requires moderately good cultivation with a fair allowance of manure; taking this into account in connection with the certainty that there is in this country a good market for wheat at remunerative prices, the miserable position it occupies in the cropping of the Presidency is, I think, conclusive evidence of the low condition of the agricultural practice pursued. Again, sugarcane is another crop which requires manure and moderately good cultivation, and this occupied but 36,000 acres of the 22⅓ millions of acres under crop last year, and it grows well nearly in all parts of the Presidency.

(*g*) *The entire absence of any fodder or root crops raised for the food of stock.*—There is no crop especially grown for feeding stock which

* Includes some land twice charged, being cultivated with 2 crops during the year.

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in any way resembles the fodder, roots, and other restorative crops of more civilized countries. Nearly every acre of the 22⅓ millions of acres was occupied by what is termed in agriculture an exhausting crop. As I have before pointed out, crops that need the liberal supply of manure are almost unrepresented in the cropping of this Presidency.

(*h*) *Low commercial value of the agricultural produce of Southern India.*—In the English Market, Madras cotton is generally from 25 to 50 per cent less in price than American cotton; Madras rice is only about half the value of American rice; Madras tobacco will scarcely command a sale, excepting for the manufacture of sheep washes. Indigo, coffee, and tea command good prices, but then these are produced under European management.

(*i*) *Poverty of the arable soils of the Presidency.*—In the absence of analyses of the different arable soils of the Presidency it is exceedingly difficult to produce proof of their poverty in plant food, as the small crops obtained may be the result of inferior cultivation rather than due to the poverty of the soil. Though I am unable to produce evidence as conclusive as I should desire, I am able, from the results of the investigations made by Mr. Broughton regarding the quality of country tobacco, to produce some facts which throw a great deal of light upon the matter. Mr. Broughton determined only the quantity of carbonate of potash in the ash of the tobaccos he examined; however, the quantity of this mineral in the ash of the tobacco plant bears a very close relation to the quantity in the soil that produced the tobacco, and therefore the information gathered by Mr. Broughton possesses considerable value as indicative of the quantity of potash in the arable soils of the Presidency. The following are the results:—

Districts in which Tobacco was produced.	Number of Analysis.	Average per cent of Carbonate of Potash in Ash.
Vizagapatam	7	9·76
Trichinopoly	6	6·01
Bellary	4	6·22
Nellore	2	6·96
Cuddapah	12	4·39
Tanjore	1	8·71
North Arcot	5	4·58
South Arcot	3	11·29
Nilgiris	2	17·81
Kurnool	5	5·73
Coimbatore	13	7·68
Kistna	10	13·52
South Canara ...	1	5·6
Madras	5	·70
Chingleput	2	·63
Madura	15	7·02
Salem	4	8·05

For comparison I give below a statement showing the quantity of potash in a few samples of tobacco produced in other countries:—

	Per cent.
Maryland tobacco	40·7
Do. do.	47·4
Massachusetts tobacco ...	47·8
Hungarian do.	26·46

Professor Emil Wolff of the Royal Academy of Agriculture, Wirtemberg, publishes seven analyses of tobacco, the ashes of which contained on the average 27·4 per cent of potash, and one sample of which contained as much as 54 per cent. There is a very marked difference between the quantity of potash in the ash of tobacco raised in this Presidency and in other countries, due, I think, entirely to the different quantity of potash in the soil.

To show what an important part potash plays in the food of plants, I would direct attention to the following, showing the quantity of potash in the ash of some of our more important agricultural products:—

	Per cent.
Potatoes	59·8
Turnips	39·3
Lucerne	25·3
Cotton lint	41·20
Cotton seed	35·44
Wheat	31·1
Barley...	21·9
Maize	27·0
Paddy...	18·4
Cholum	11·9

The deficiency of potash in the arable soils on which tobacco is grown, which are always more highly cultivated and manured than any other soil under crops, is, I think, strong evidence that our soils are gradually becoming exhausted.

The yield of the soils is also worth considering; thus, while in Madras, the Ryot is contented to get 70 or 80 pounds of clean cotton per acre, the American Farmer is not contented unless he gets from 450 to 500 pounds per acre. The same with rice; an average crop of paddy in this Presidency is about 15 bushels per acre; in America, 70 bushels is no unusual crop. In Madras a maize crop of 10 bushels per acre is a good one; in America crops of this grain vary from 50 to 80 bushels, and sometimes even amount to 100 bushels per acre.

(*j*) *The inferiority of the agricultural live-stock of the Presidency.*—The inferiority of our live-stock, with some slight exceptions, is so universally admitted that I need only mention this fact as another evidence in proof of the low condition of our agriculture."

We must confess that the above facts are not reassuring. What are we to

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do? We are told, and no doubt truly, that our soil is poor; that it is being made poorer by the exhausting crops grown, and the habitual disregard to the necessity of manure; that our cattle are small, ill-conditioned and inferior; that, in short, every thing is going down hill. The just, and proper, inference is that we all, the inhabitants of the country, must be deteriorating also. Poor soil means poor grain and fodder; poor grain and fodder-supply means poor half-starved cattle; and poor half-starved cattle means an underfed, sickly race, such as no doubt the majority of the people are. Ask any medical man what is the most common cause of the diseases the sufferers from which fill the wards of our hospitals. He will tell you "Privation—a want of good and sufficient food." This is perfectly true. Of course it applies in its widest sense to those classes who naturally seek hospital aid; but does it not apply in some measure to ourselves? Is the climate alone to blame for the decadence of European pluck, energy, and *verve* that we too often see in ourselves? How many of us who have been out ten years or more, must confess to a ridiculous nervousness, a shrinking from fatigue, and pain, of which we should have been heartily ashamed a few short years ago? India offers many advantages, among the greatest of which are our virtually open-air life and almost perfect ventilation; but unless something can be done to improve the soil that feeds our cattle, we shall never hold our own, never improve the races of the country, nor fulfil our Mission in India.

Swamp Irrigation.—In his remarks on this subject, Mr. Robertson explains away any possible misunderstanding of his previously enunciated opinions on this subject. He has always said that swamping was not irrigating, still less was it cultivating. He tells us that he never meant to deny the advantages of irrigation. What he wanted us to understand was, that to turn a quantity of water on to land as little porous (so far as sub-soil is concerned) as a cistern, and to keep it stagnant there, until by evaporation and leaking it disappeared, was not aiding in the production of a good crop of rice, though it was a fruitful seed-bed for malarial disease. We copy from Mr. Robertson's pages an extract from a report on irrigation in Spain by Mr. Clements Markham.

"The cultivation of rice around the shores of the Albufera was introduced by the Arabs, and was prohibited on account of its unhealthiness and the waste of water it occasioned, by King Martin of Aragon in 1403 A.D. Permissions and prohibitions have alternated since that time, and Cavanilles recommended the total discontinuance of a cultivation which produced so many fevers and such swarms of mosquitoes. Attempts have been made near Valencia to grow rice without irrigation, but they were fruitless.

"It would certainly appear that, apart from its extreme unhealthiness, the cultivation of rice in this country is open to serious objections. The continuous harvests and incessant swamping wear out and enervate the land, and now the use of guano and other manures is essential. The rice is sown in April and May, and reaped in September, so that the swampy land is seldom exposed to the influence of heat, and the stagnant water keeps it in a constant state of saturation, and rapidly neutralizes its fertilizing properties. At present the cultivation of rice is very strictly prohibited beyond certain prescribed limits, and the use of guano as manure is believed to have decreased the pernicious effects of the swamped land, though in what way it is difficult to understand."

There is no doubt that were a rational quantity of water judiciously employed in sub-soil-drained fields, our irrigation works would keep better pace with the requirements of the country, and we should see fewer of the gaunt, spectral-like victims of malarial fever.

Treatment of Salt Lands.—On this subject Mr. Robertson says he has but little personal experience; but from the information he has collected, he has come to the conclusion that the only remedy is deep

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sub-soil draining. On this point he has received much information from Mr. Boswell, the late lamented Collector of Kistna, also from the Tahsildars of the district of Coimbatore through the kindness of Mr. Wedderburn, the Collector.

We quite agree with Mr. Robertson in thinking that it would be a great advantage to agriculturists if Government would publish, but not three months in arrears, correct agricultural price lists. We know it was a matter of thankfulness among careful housewifes when a correct Bazaar Price List of Domestic articles was published every week by the papers.

Live Stock.—The Aden cattle that were imported in 1874 do not seem to have fulfilled all Mr. Robertson's expectations; but as he has not yet had a fair chance of ascertaining their milking qualities, he refrains from giving any decided opinion on their value. Under this head we find some very interesting statistics regarding the milk yielded by a fine cow, a cross between a Devon Bull and a Nellore Cow. The cow was the property of the same lady who furnished Mr. Robertson with the statistics mentioned by him in his report for 1872. She kept the register, of the amount of milk drawn morning and evening, herself. The whole experiment was most carefully conducted, the results are thoroughly reliable in every respect, and they are no doubt very satisfactory. The record extends over six months, during which time the cow's food consisted of

Green fodder ...	40 lbs.
Ground-nut cake.	4 „
Wheat bran ...	2 „
Salt	1 dessert spoonful.

"The total quantity of milk yielded during the six months was 799 measures and 6 ollocks or 2,399 imperial pints. The prices paid for the food, &c., of the cow during the experiment were as follows:—ground-nut cake 65 lbs. per Rupee, bran 32 lbs. per Rupee, green fodder 300 lbs. per Rupee, straw for bedding, salt, &c., 1 Rupee per month, and attendance Rupees 3 per month (the man having other duties to perform). The total cost incurred during the six months was—

	RS.	A.	P.
168 days, green fodder at 40 lbs. daily	22	6	5
168 days, ground-nut cake at 4 lbs. daily	10	5	5
168 days, bran at 2 lbs. daily	10	8	0
Straw and salt	6	0	0
Attendance	18	0	0
Total...	67	3	10

If from this amount we deduct Rupees 15, the value of the calf at 6 months old, there remains Rupees 52-3-10 as the cost of the 799 measures and 6 ollocks of milk or, say, in round numbers, 800 measures for Rupees 52, equal to one anna per measure; it should, however, be remembered that the yield of milk will gradually continue to diminish until the cow again calves, and, as the cost of maintaining the cow up to that period will not be less than when in full milk, the cost of the milk will be proportionally increased, but throughout the year the milk will not cost 2 annas per measure. As in the larger towns of Southern India, milk of very inferior quality sells readily for 3 annas per measure, it will be seen that in dairying a *very* profitable business could be established, and one well worthy of the attention of the "Poor Whites" of this country, regarding whom of late we have heard so much. But a dairy to be successful must command the confidence of the public.

It will be observed that the return for the 7th week is 25 per cent less than the yield of the previous week; this sudden diminution was due to the cow having been milked by a person to whom she was unaccustomed, the man who always milked her being absent from sickness; this change proved very unfortunate, for though, when the regular milker returned to his duties in the 13th week, the yield somewhat improved, it was still very much below what it would have been had the change referred to not occurred. I think it necessary to call particular attention to the facts just stated, for, though some cows will give the same quantity of milk to any milker, it is well that it should be known that with some cows a change in their attendant may lead to a very large reduction in the quantity of milk obtained.

During the first four months of the experiment the calf was allowed to take daily about one measure of milk, and about half a measure

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daily during the other two months; this milk was, of course, not brought to account in the foregoing registrations; I think it an advantage in this country to allow the calf access to its mother before and after milking as is customary in this part of India; not only does the cow yield her milk more freely, but what is of more importance her udder is thoroughly stripped after each milking; and, with the help of other food the calf can be reared at a very moderate cost. The first calf of the cow referred to was reared in this manner until about a-year old, when it was fed on food similar to that given to its mother; it was always in good condition, and will calve at three years old, fully a year earlier than it is usual for heifers to calve in this country.

I attach very great importance to this experiment; there is not, as far as I am aware, any published record of any similar experiment made in this country excepting that detailed in my report for 1872; and, before we can attempt to do anything to improve the dairy stock of the country, which so greatly needs attention, we must have reliable data for the guidance of our efforts."

Sheep.—The sheep imported from China have unfortunately not done well. The hot season appeared to try them greatly and there are now only four animals of the breed at the Farm. This want of success is the more to be regretted inasmuch as the breed is a fine one, and possesses qualities which it was hoped would, by judicious crossing, greatly improve our country breeds. The Sydapet flock of sheep appears to be doing well, and as Mr. Robertson has given us his method of management at full length, we think we cannot do better than reproduce it for the benefit of those of our agricultural subscribers who do not receive copies of the report.

"The following details regarding the management of the Sydapet flock will supply the information for which I am frequently asked. All rams are kept entirely separate from the ewes; after being weaned, the ram lambs are reared in pens and are only occasionally allowed to graze; their food consists of green fodder and ground-nut cake. I should much prefer that these sheep should be grazed more frequently instead of them being so much confined in pens, but it is so extremely difficult to keep the rams apart from the ewes when both flocks are grazing, however I intend forming a grass paddock wherein the rams can be secured and in which they can obtain food and regular exercise during certain hours of each day. The rams are not used until they are about two-and-a-half years old, at which age a good specimen will weigh from 100 to 120 lbs. live weight. The ewe flock is generally sorted over once a-year, and those of a bad form or color or with inferior wool, as well as those that have lost some of their teeth, are taken out of the flock and put aside for fattening. In September the ewes that remain in the flock are, with a number of gimmers then about eighteen months old, put to the ram; about forty ewes are placed with one ram the breast of which is colored to mark the ewes in a way that enables the shepherd to detect readily those ewes that have been served, which he removes from the flock. The lambs are born about five months after, generally about 90 per cent of the ewes proving in lamb. The ewes when about to lamb are placed in pens, three or four in each, where they are kept until their lambs are about three weeks old, after which they are again put into the flock in the sheepfold. All males that do not promise to turn out well are, when about six weeks old, made into wethers. When about three months old the lambs are removed from their mothers and are weaned, about a fortnight's separation sufficing for this, after which the wether and gimmer lambs are grazed in the flock with the ewes, the ram lambs being placed by themselves as previously noticed. All the sheep are generally clipped in April, which, I find, is the best month in the year for the purpose. When the ewes are being clipped, it is usual to mark the lambs in a way to render their identification easy; in the farm flock this is done by cutting a small hole by means of an ear-pincer in the cartilage of one ear of each. During the season of the year when night dews are heavy the sheep do not leave the fold in the morning until the sun has removed the greatest part of the dew; it was found when the sheep were turned out too early in the morning to feed upon grass heavily covered by dew that a number of them were invariably attacked by dysentery of a severe type. During the hottest part of the day the sheep return to the fold for a few hours, and again go to graze until about five in the evening, when they again return and receive about half a pound of ground-nut cake per head, and are shut up in the fold for the night. During very dry weather they receive, in addition to the cake, a small quantity of green food, but they are maintained chiefly by the food they gather when out grazing. The sheep thus fed are kept in a thriving condition; they are, of course, not fit for the butcher, but they are generally in the condition that it is most desirable for breeding stock to be. I have tried various months in the year in which to put the ewes with the ram. Under

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the impression that lambs born in December would thrive best from the abundant grass at that season available, I put the ewes with the ram in July, but the result of the experiment was disastrous, as a very large proportion of the lambs died, evidently, I think, from their mother's milk being unfitted for them, the result of the too liberal consumption of immature hastily-grown grass. Next year the lambing season was postponed a fortnight, and the result was fewer deaths amongst the lambs. From this time the lambing season was each year made later until it fell in the middle of February, at which time of year it was found that fewest deaths occurred amongst the lambs, the death-rate having sunk from at the least 20 per cent down to at the outside 5 per cent. This experience may be useful to owners of flocks; it was only recently that I was consulted regarding the management of a flock the lambs of which every lambing season died in great numbers; on inquiry, I was informed that each year's lambs generally fell about a month after the close of the monsoon rains, and to this fact I attributed the great mortality. Whenever ewes are suckling their lambs, and are feeding on the hastily-grown grass produced by the monsoon, loss amongst the lambs will be inevitable; I am convinced that the only way to avoid great mortality amongst lambs in Southern India is to arrange for their birth to occur after the sun has had time to harden the monsoon grass, and remove its pernicious qualities."

Pigs.—The China pigs did as badly as the China sheep, and we are not likely to improve our existing breeds much from that quarter. Possibly an English boar or two might be an acquisition?

Poultry did well. The birds are imported from Sydney; they thrive well, and appear to be well adapted for improving the existing breeds. Since the publication of the Report, Mr. Robertson has received some Pekin ducks which are a most superior breed. They seem to thrive well in the heat of Madras; and though Mr. Robertson has experienced some trouble with rearing the ducklings, he is disposed to attribute this to want of proper accommodation.

We must close our resumé for the present, but we shall hope to give a brief sketch of the remainder of the Report in our next issue.

DAWES' REVENUE CODE.

We have great pleasure in reviewing the Revenue Code, compiled by Mr. F. J. Dawes, Deputy Tahsildar of the Shervaroy Hills. The Regulations and Acts relating to Revenue matters from 1802 to 1875 have been carefully collated, and in many instances they are illustrated by the light of the Circular Orders of the Board of Revenue, and the Rulings of the High Court. A book of this kind cannot but be of great use to students and practitioners.

We feel it, however, our duty to repeat here the remark we made some little time ago, when reviewing another book,* namely, that it would be better to print the Regulations and Acts in chronological order, than according to the nature of the contents.

* Cunningham's Statutes, Acts and Regulations.

We find that the book contains some Acts which do not belong to Revenue matters, such as, the Act for the Registration of Documents, the Regulations defining the Rights of Individuals to Hidden Treasure, and the Act relating to the Exportation of Military Stores. This may be an error, but it is one in the right direction. Better to have a superfluity than a deficiency.

The typography of the work is good, and does much credit to the *Caxton Press* in Bangalore, in which it was printed.

HIGH COURT—BOMBAY.

[*Appellate Civil Jurisdiction.*]

West and Nanabhai Haridas, JJ.

Court Fees Act VII of 1870, *Section* 16—*Pauper Respondent—Memorandum of Objections—Civil Procedure Code (Act VIII of* 1859) *Section* 348—*Pensions Act XXIII of* 1871, *Sections* 4, 5, 6, 8, 9 *and* 14—*Certificate by Collector.*

A pauper respondent is not entitled to present objections at the trial of an appeal without payment of stamp duty.

Section 4 *of the Pensions Act XXIII of* 1871 *debars the Civil Court from taking cognizance of any suit, whether the Government is a party to it or not, which relates to any pension or grant of money or land revenue conferred or made by the British or any former Government—without a certificate from the Collector or other authorized officer. Section* 5 *prescribes a remedy for the claimant of such pension or*

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grant, and Section 6 enables the revenue officer to refer the parties to the Civil Court for the determination of their respective interests in the income or other benefit, which the executive will, however, still, as against either or both of the litigants, be at liberty to allow or to withhold.

Lands held free of assessment under a grant from Government, which bestows on the grantee the lands themselves and not merely the Government revenue arising from them, do not fall within the provisions of the Pensions Act.

S. A. 227 *of* 1875.

Babaji Hari *v.* Rajaram Ballal and another.

THIS was a special appeal from the decision of E. Hosking, Assistant Judge of the District of Satara, in Appeal No. 232 of 1874, reversing the decree of Atchut Jagannath, Subordinate Judge of Rahimatpur.

The plaintiff Babaji *in formâ pauperis* sued the defendants, his cousins, to have his right declared to a ninth share in the *Kulkarni*, *Jyotishi* and *Deshpande Watan* of certain villages in the Collectorate of Satara. He also claimed eleven years' arrears of this *watan*, which consisted partly of *inam* lands and partly of allowances paid from the Government Treasury.

The defendants pleaded the Limitation Act and urged other objections, which, for the purposes of this report, it is not necessary to notice.

The Subordinate Judge, on the evidence, found the claim proved, except as to the alleged share in the *Jyotishi Watan*, and disallowing the defendants' plea of limitation, gave the plaintiff a decree accordingly.

The defendants in appeal repeated the objections they had taken in the first Court, and for the first time urged that the cognizance of the suit was barred by the provisions of the Pensions Act of 1871, there being in the case no certificate by the Collector, or any other authorized officer, permitting the suit to proceed as required by Sections 4 and 6 of the Act.

The plaintiff under Section 348 of the Code of Civil Procedure presented a memorandum of objections against the refusal of the Subordinate Judge to award him a share in the *Jyotishi Watan*. This bore no stamp, but he urged that he being a pauper no stamp was necessary.

The Appellate Court was of opinion that the respondent, though a pauper, was by Section 16 of the Court Fees' Act not exempted from the payment of stamp duty, and that his memorandum, therefore, could not be admitted. Finding also that there was not the certificate required by Section 6 of the Pensions Act, the Appellate Court reversed the Subordinate Judge's decree, and rejected the plaintiff's claim *in toto.*

The special appeal was heard by West and Nanabhai Haridas, JJ.

Ghanasham Nilkanth for the special appellant, the plaintiff:—The *watan*, of which the plaintiff seeks to recover a share, consists of lands as well as money allowances. With regard to the former, no certificate is necessary. See Special Appeal No. 507 of 1873, *Ravji Narayan Mandlik* v. *the Mamlatdar of Ratnagiri Taluka*, per Westropp, C. J., and Larpent, J., 2nd September 1875. Nor is any certificate necessary in a suit between private parties. The term 'any suit' in Section 4 of Act XXIII of 1871 should be so construed as to mean only a suit in which the Government or any of its officers is a party. Had the Legislature intended to debar the Civil Courts from the cognizance of all suits relating to pensions or money grants conferred by the Government, it would have said so in more precise and emphatic language than it has done in this or any other section of the Act. So important a privilege as that of suing in the Civil Courts should not be taken away by so imperfectly expressed an enactment. Nor will the Courts divest themselves of jurisdiction unless it be explicitly taken from them by the Act. Section 5 of the Act provides that a claimant of grant of money or land revenue may go to the Collector for the disposal of his claim, which may be disposed of according to such rules as the chief revenue authority may prescribe,* or be certified under Section 6 of the Pensions Act as a matter fit for the adjudication of the Civil Courts. But neither Section 5 nor any other section lays down that a claimant shall not go to the Civil Court directly. The joint effect of Sections 4, 5, and 6 seems to be—*first*, that when a person wishes to proceed against a private individual, no certificate whatever is necessary; *secondly*, that if he does ask the Collector to dispose of his claim, he must abide by his decision as arrived at in conformity with departmental rules; *thirdly*, that if dissatisfied with the decision, or expected decision, his only remedy is the permission of the Collector for the trial of the suit by the Civil Court; but, *fourthly*, that if a person chooses to go to the Civil Courts directly without the intervention of the intermediate step, there is no objection to his doing so. This intermediate step is not altogether superfluous or unreasonable. It is quite consistent with reason to suppose that the Legislature should have provided a short and summary procedure for the disposal of their bounty; but that, at the same time, they should have imposed the necessity of providing a certificate from one of their authorized officers as a condition for a person wishing for a judicial decision after having elected to move for the adoption of the summary procedure.

* These rules were published on 7th August 1873. *See* the *Bombay Government Gazette* of that date, p. 656.

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A pauper respondent is not obliged to pay stamp for his objections. Section 16 of the Court Fees' Act only intended to place a pauper respondent on the same footing as a pauper appellant.

Pandurang Balibhadra:—The property in dispute is all *watan* property attached to offices, the revenue of which is alienated to the grantees. The whole of it is, therefore, amenable to the Pensions Act. The object of this Act is to leave the Government and its officers unfettered in the disposal and distribution of their bounty. It is only in case they feel a difficulty that the Act allows recourse to be had to the Civil Courts. This is a condition precedent to the Civil Courts' jurisdiction; and the Legislature has in Section 6 provided a form which that condition is to assume. The Collector's certificate is, therefore, absolutely necessary in all suits independently of whether Government be a party or not. If Section 4 was not meant to exclude suits between private parties, there was no necessity to enact Section 9, whereby an exception is made in favor of suits between *Inamdars* and their tenants.

Ghanasham Nilkanth in reply:—The object of the Pensions Act is not to control the Civil Courts in determining the relative rights of coparceners but to protect the Government. As long as Government have not to pay more than the aggregate sum admitted by them to be due, it does not matter to them how it is distributed amongst the sharers.

West, J., in delivering the judgment of the Court said:—The first point that arises for disposal is, whether a pauper respondent is entitled to present objections at the trial of an appeal without payment of stamp duty under the Court Fees' Act VII of 1870. Section 16 of that Act says absolutely that "the Court shall not hear such objections until the respondent shall have paid the additional fee" due under the Act. No exception is made in favour of pauper respondents. It has been argued by Mr. Ghanasham that a pauper respondent is, when he presents an objection, a pauper appellant, and entitled to the indulgence in that character; but the grammatical construction of the Act does not allow this indulgence to him, and the reason for this probably was that he already had the opportunity of directly making an appeal without expense for Court fees, and that an inquiry into his pauperism at the last stage of the case would involve great delay and inconvenience. We do not think, therefore, that there is any good reason for departing from the literal construction of the enactment to which we have referred.

The second point is, whether the claim was wholly or in part placed beyond the jurisdiction of the Civil Courts by the provisions of Act XXIII of 1871. On the mere grammatical interpretation of Section 4 of that Act no doubt, we think, could reasonably be entertained of its shutting out the jurisdiction of the Civil Courts, in a case like the present. Doubt is created only by the anterior improbability of the Legislature's having intended to shut out all co-sharers in public *beneficia* from the ordinary Courts even for the determination of their relations *inter se*, without expressing that intention more directly and emphatically than it has done in Act XXIII of 1871. That Act is, in its earlier portion, obviously intended to guard the executive Government against responsibility to the Civil Courts; but it has been contended that Section 4 should be construed as extending only to claims made against Government for either the whole or some portion of an alleged alienation or allowance out of the revenues. Section 6, it is urged, would then apply to cases in which the executive, absolute as it is with respect to such matters, might desire to be guided by a knowledge of the legal, or *quasi* legal, relations of the parties. But if Section 4 had been intended to apply only to suits against Government and its officers, it is hard to conceive that this should not have been plainly said. As it stands, the section extends to all suits relating to any grant of money made by Government; and the plaintiff, who seeks a share in such a grant from his alleged co-sharers, must, we think, be said to bring a suit relating to the grant. Section 5 provides another remedy, such as it is, for the claimant shut out from the Civil Court; and the true intention of Section 6, we think, is to enable the revenue officer, who may be puzzled by the duty which Section 5 casts on him, to refer the parties to a Civil Court for the determination of their respective interests in the income or other benefit which the executive will still, as against either or both of the litigants, be at liberty to allow or to withhold. Section 9 of the Act provides for the case of an *Inamdar* suing his inferior holders or tenants for the land revenue due to him which, it is said, he may recover as he would recover rent. "Nothing in Sections 4 and 8," it is said, shall preclude him from this remedy, and, unless Section 4 was intended to affect other suits than those against Government, this mode of expression would not have been adopted. Again, Section 14, Art. (8), enables the chief controlling revenue authority to make rules for "reference to the Civil Court under Section 6 of persons claiming a right of succession to, or participation in, pensions or grants of money or land revenue payable by Government," which rules are to have the force of law. A person claiming participation in a payment might, no doubt, go direct to the Collector to ask for it, and then be referred to the Civil Court, without such a course necessarily excluding an alternative resort to the Civil Court and the exercise of the Court's jurisdiction in the case of one seeking, without application to the

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Collector, to establish his right as against his usurping co-sharer; but this is not the necessary construction, nor, we think, looking to the general purpose of the Act, the most probable one. That purpose appears to be to keep the distribution of what is regarded as a bounty of Government wholly in the hands of its executive officers; and if suits for shares could be brought, and rights, or the semblance of rights, established, by some co-sharers, while Government was paying the whole proceeds of a cash allowance to other sharers, the reclamations of the former would at least be embarrassing. They would practically necessitate an investigation by the revenue officer under Section 5, which must terminate by an adjudication similar to that of the Civil Court if it were meant to command any public confidence, or else would entail a reference to the Civil Court under Section 6 with a similar result. Thus, private parties refused a hearing, or such a hearing as they desired, by the revenue officer, might, so to speak, force his hand, and gain their end by a circuitous process. This cannot have been intended, and the grammatical interpretation of Section 4 prevents such a consequence arising.

We are of opinion, therefore, that, even when proposing to sue a co-sharer to establish his right to an *aliquot* portion of any allowance paid by Government, the suitor must go to the revenue officers and obtain their permission to proceed, and a corresponding certificate under Section 6. We have arrived at this conclusion reluctantly, and not without some doubts as to its correctness; but, upon the whole, we do not think we can properly construe the Act in any other sense than that which we have given to it.

These remarks apply only to the allowances paid by Government to the family to which the parties belong. As to the lands held by them free from assessment, it has recently been held in this Court by the Chief Justice and Larpent, J., (Special Appeal 507 of 1873) that land held under a grant bestowing them, and not merely the Government revenue arising from them, do not fall within the provisions of the Pensions Act. Mr. Pandurang has contended that there is necessarily a Government revenue arising from the lands in this case, and that it does not appear clearly that the lands, and not merely the revenue arising from them, are held by the parties. But freedom from liability to land revenue is not identical with holding a grant of land revenue, any more than the extinction of an easement by becoming sole proprietor of the property, servient as well as dominant, is a grant of an easement. The land revenue arising from a man's own holding, when it is remitted, and the land pays nothing, is rather extinguished than granted. The lands were not in this case claimed for possession *in specie*; but the reason assigned for this is that they are occupied by lessees who cannot be displaced; the point was not raised in the Court of first instance that the claim was one for alienated land revenue, and we understand it to have extended to the lands themselves, subject, of course, to the rights of the tenants.

We must, therefore, as to the lands in the proceeds of which the plaintiff seeks to establish his right as a sharer, remand the cause to the District Court, that the Judge, after determining what portion of the claim relates to lands, as distinguished from money allowances, may pronounce on the other points that arise, viz., as to whether the suit was barred by limitation, and as to what deductions, if any, are to be made on account of expenditure necessarily or properly incurred by the defendants out of the property in which the plaintiff claims a share. He will take such evidence as the parties may adduce on these points respectively.—*The Indian Law Reports*, Vol. I, Part IV, page 75.

HIGH COURT—ALLAHABAD.

[*Appellate Civil.*]

TURNER, OFFG. C. J., AND SPANKIE, J.

Act VIII of 1859, *Section* 2—Res judicata.

When a plaintiff claims an estate, and the defendant, being in possession, and knowing that he has two grounds of defence raises only one, he shall not, in the event of the plaintiff obtaining a decree, be permitted to sue on the other ground to recover possession from the plaintiff. (Woomatara Debia *v.* Unnopoorna Dassee).*

Where, therefore, the defendants purchased an estate in the plaintiff's possession and sued him to recover possession of it, and the plaintiff resisted the suit merely on the ground that he was the auction-purchaser of it, and the defendants obtained a decree, and the plaintiff then sued claiming a right of pre-emption in respect of the property, a claim which he might have asserted in reply to the former suit, HELD, *that he was debarred from suing to enforce such claim.*

Baldeo Sahai *v.* Batcshar Singh and others.†

THE defendants purchased on the 18th September 1873, a share in mauza Tajpur which was in the possession of the plaintiff. The plaintiff denied the title of their vendor, alleging that he was in possession of the property in virtue of its purchase at an auction-sale. The defendants accordingly brought a suit

* 11 B. L. R. P. C., p. 158.

† Special Appeal No. 18 of 1875, from a decree of the Subordinate Judge of Ghazipur, dated the 30th September 1874, reversing a decree of the Munsiff of Ballia, dated the 15th August 1874.

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against him to recover possession, by the establishment of the title of their vendor. The plaintiff pleaded his title as auction-purchaser. The defendants obtained a decree for the possession of the property, and applied for its execution, upon which the plaintiff instituted the present suit, claiming a right of pre-emption in respect of the property, basing the claim on a condition in the village administration-paper to the effect that it was competent to each proprietor to sell his own share, but so long as an *haq shafawala* (pre-emptor) was willing to buy it, it must not be sold to a stranger. The defendants pleaded that the plaintiff was not in a position to advance a right of pre-emption, because he had neglected to do so in the former suit, and merely impugned the title of their vendor.

The first Court held that the plaintiff was entitled to maintain the suit, notwithstanding his omission to set up his pre-emptive title in the previous suit; and decreed the claim. The lower Appellate Court dismissed the suit on independent grounds which it is immaterial for the purposes of this report to state.

On special appeal by the plaintiff to the High Court the defendants again contended that the plaintiff was estopped from suing to enforce the right of pre-emption claimed by his omission to plead the right as an answer to the former suit.

Munshi *Hanuman Parshad*, Munshi *Sukh Ram*, and Lala *Lalta Parshad* for the appellant.

The *Senior Government Pleader* (Lala *Juala Parshad*) and Pandit *Bishambar Nath* for the respondents.

The judgment of the Court was as follows:—

In 1873 the respondents purchased the share of which the appellant claims pre-emption. The appellant denied the title of the vendor, but the respondents instituted a suit against the appellant, and having succeeded in establishing their vendor's title, they obtained a decree for possession. The appellant then instituted the present suit to have the sale to the respondents set aside, and a sale concluded in his favor as pre-emptor. It is contended that, the respondents having succeeded in obtaining a decree for possession in a suit to which the appellant was a party, he is now debarred from suing to enforce a claim which he might have asserted in reply to the claim formerly made by the respondents, and decreed in their favor. We admit the validity of the plea. It would have been a good answer to the claim then advanced that the sale on which it was founded was invalid, in that the defendant was entitled to a prior right of purchase and ready to exercise it. In *Srimut Rajah Mootloo Vijaya* v. *Katama Natchiar*,* it was declared by the Privy Council that, "when a plaintiff claims an estate, and the defendant, being in possession, resists that claim, he is bound to resist it upon all the grounds that it is possible to him, according to his knowledge, then to bring forward," and that, if he fails to do so, he is estopped from asserting any of them thereafter. This dictum was cited and re-affirmed in *Woomatara Debia* v. *Unnopoorna Dassee*,† decided by the Privy Council on May 13th, 1873. We must, then, allow the plea urged by the respondents and dismiss this appeal with costs.‡—*The Indian Law Reports*, Vol. I, Part III, page 75.

CIRCULAR ORDER OF THE BOARD OF REVENUE.

No. IV.

STANDING No. 198-5.

LIQUORS OTHER THAN THOSE INCLUDED IN THE ABKARI FARM.

Proceedings of the Board of Revenue, dated 1st May 1876, *No.* 1,134.

IN issuing licenses for the wholesale and retail vend of liquors other than those included in the Abkari farm, Collectors will adopt the annexed amended Forms I. and K., which contain an additional condition to the effect that accounts are to be kept, that they are to be open to inspection at any time, and that the licensee shall furnish such returns of sales as the Board shall from time to time prescribe.

2. It will be observed that the privilege of vending *country brewed* beer is not conveyed by the amended licenses. For the sale of country brewed beer, wherever shops have been sanctioned under the Board's orders, licenses in the same form will be issued conveying the privilege of vending country brewed beer only on payment of the regulated fees, viz., Rupees 25 for a wholesale and Rupees 15 for a retail license.

Vide Board's Proceedings, dated 17th Jany. 1876, No. 117.

I.—*Form of License for the sale of Liquors (other than those included in the Abkari Farm and country brewed Beer) not to be drunk on the premises.*

I, A. B., Collector of the District of , being duly authorized by the Board of Revenue

* 11 Moore's Ind. App., p. 73.

† 11 B. L. R. P. C., p. 169.

‡ *See Maktum Valad Mohidin* v. *Imam Valad Mohidin*, 10 Bom. H. C. R., p. 293, and *Janaki Ammal* v. *Kamalathammal*, 7 Mad. H. C. R., p. 263.

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under the provisions of the Abkari Act (Madras Act III of 1864) in consideration of the payment of a fee of Rupees 25, hereby license C. D. to vend at in the district of during the Revenue year ending June 30th 187 , such liquors as may not be included in the Abkari farm of with the exception of *country brewed* beer (*and to grant permits for the transit within the said district of such quantities of liquor as may have been sold by him not exceeding fifty gallons**) on the following conditions:—

* To be entered in such licenses only as the Collector thinks proper.

1st.—That the said C. D. shall not sell to any one arrack or toddy, (fermented palm-juice,) or country brewed beer, or any liquor included in the Abkari farm of

2nd.—That the said C. D. shall not permit any person to consume on the said C. D.'s premises any of the liquor sold by the said C. D.

3rd.—That the said C. D. shall not sell or give any liquor to any Non-Commissioned Officer or Soldier without the permission of the Commanding Officer in writing, nor to any member of the Mofussil Police while on duty, nor to any European Vagrant under escort without the consent of the escort.

4th.—That the said C. D. shall not sell liquor to any person in any quantity less than half a gallon at a time, and that in sales of bottled liquors the said half gallon shall be taken to represent three ordinary wine bottles.

5th.—That the said C. D. shall keep accounts showing the quantity of liquor obtained by him for sale, the source whence it has been obtained and the quantity sold, that such accounts shall be at any time open to the inspection of the Collector or any subordinate whom he may depute for that purpose, and that the said C. D. shall furnish such returns of sales as the Board shall from time to time prescribe.

6th.—That this license shall be revocable by me forthwith if the said C. D. fails to conform to any of its conditions, and shall be revocable with the sanction of the Board of Revenue for any other cause on giving fifteen days' notice of such recall.

Given under my hand and seal this day of in the year 187 , at

(Signed) A. B.,
Collector.

N. B.—Any breach of the conditions of this license will render the above-said C. D. liable to the penalties prescribed in the Abkari Act.

K.—*Form of Retail License for Hotels, Refreshment Rooms, Taverns, &c., for sales of Liquors (other than those included in the Abkari Farm and country brewed Beer) to be consumed only on the premises.*

I, A. B., Collector of the District of , being duly authorized by the Board of Revenue under the Abkari Act (Madras Act III of 1864) in consideration of the payment of a fee of Rupees 15, hereby license C. D. to vend by retail at all spirituous and fermented liquors other than those included in the Abkari farm of with the exception of *country brewed* beer, during the Revenue year ending June 30th, 187 , on the following conditions:—

1st.—That the said C. D. shall not sell to any one arrack or toddy or any other liquor which may be included in the Abkari farm of or *country brewed* beer.

2nd.—That the said C. D. shall not permit any person to remove from his premises more than one pint of any of the liquors purchased from him.

3rd.—That the said C. D. shall not sell or give any liquor to any Non-Commissioned Officer or Soldier without the permission of the Commanding Officer in writing, nor to any member of the Mofussil Police while on duty, nor to any European Vagrant under escort without the consent of the escort.

4th.—That the said C. D. shall not sell any liquor between the hours of 9 P. M. and 6 A. M. except to lodgers in his house or to *bonâ fide* travellers arriving between those hours.

5th.—That the said C. D. shall prevent all drunkenness or gaming or disorder within his premises, and shall conform in all other respects to the provisions of the Abkari Act.

6th.—That the said C. D. shall keep accounts showing the quantity of liquor obtained by him for sale, the source whence it has been obtained and the quantity sold, that such accounts shall be at any time open to the inspection of the Collector or any subordinate whom he may depute for that purpose, and that the said C. D. shall furnish such returns of sales as the Board shall from time to time prescribe.

7th.—That this license shall be revocable by me forthwith if the said C. D. fails to comply with any of the conditions contained in it, and with the sanction of the Board of Revenue shall be revocable for any other cause on giving fifteen days' notice of such recall.

Given under my hand and seal this day of in the year 187 , at

(Signed) A. B.,
Collector.

N. B.—A breach of any of the conditions of this license will render the said C. D. liable to the penalties prescribed in the Abkari Act.

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OFFICIAL PAPERS.

Castilloa.

Proceedings of the Madras Government, Revenue Department, 3rd May 1876.

Read the following letter from A. O. HUME, Esq., C.B., Secretary to the Government of India, Department of Revenue, Agriculture, and Commerce (Forests,) to the Secretary to the Government of Madras, dated Calcutta, 17th April 1876, No. 328 :—

With reference to Mr. Collins' report on the caoutchouc of commerce forwarded to the Government of Madras with Her Majesty's Secretary of State's Despatch, No. 8 (Revenue), dated the 30th April 1873, I am directed to transmit copy of a despatch No. 27 (Revenue—Forests) of the 23rd December last and of its enclosure, and to request, in case the Government of Madras desire that the Castilloa should be cultivated in the garden on the Coonoor Ghaut, that the Secretary of State may be addressed direct as regards the number of plants required and the mode and time of their transmission from England.

2. I am to add that the Castilloa being a purely tropical tree, regarding which it is doubtful whether it will stand the long dry and hot season of the greater part of the Peninsula of India, it may perhaps, be found that Travancore offers the only locality in the Peninsula suitable for its cultivation on a large scale, but that perhaps a commencement may usefully be made in the garden below the Coonoor Ghaut.

Enclosure No. 1.

Despatch from the Right Honorable the Secretary of State for India.

Revenue—Forests, No. 27. India Office, London, *23rd December* 1875.

My Lord,—I have to acknowledge the receipt of your Excellency's despatch, dated the 6th of September (No. 18) 1875, and am glad to find that the plantations of Ficus elastica in Assam are on the whole progressing satisfactorily. Together with the cultivation of the plants, the questions relating to the best time for tapping, the yield per tree, and to improvements in the collection and manufacture should receive careful attention.

2. With a view to the introduction of the valuable India-rubber yielding trees from South America into India, I have sanctioned several steps to be taken, and among others the employment of Mr. Cross to obtain plants of the Castilloa trees from the forests of the Darien Isthmus. Mr. Cross has performed this service successfully, and has brought home 300 *Castilloa cuttings*, which are now established in a hot-house at Kew. They will be transmitted to India in accordance with advice received from Dr. Hooker as to the time and method, and I herewith transmit, for the information of your Government, copy of Mr. Cross' account of the native habitat and growth of the Castilloas. Dr. Hooker suggests that it is desirable that both the Hevea and the Castilloa plants should not be detained at the Calcutta gardens, where the climate will be injurious to them, but that they should be entrusted to the care of Mr. Gustav Mann and forwarded to Assam with as little delay as possible.

I have, &c.,

(Signed) SALISBURY.

His Excellency the Right Honorable
The Governor-General of India in Council.

Extracts from report on the collecting of seeds and plants of the India-rubber tree (*Castilloa elastica*) in the forests of the Isthmus of Darien by Robert Cross.

The tree is found growing from 1° south latitude to 20° or more north of the equator, but in such a wide expanse of country there are probably various varieties, most of which, however, may bear a close resemblance to each other, although some may be of more robust habit than the rest and attain to a greater size.

Of late years a good deal of India-rubber has been brought from the forests on the Pacific Coast south of Panama near to a scattered village called Darien. The Indians in this region have been rather hostile to the collectors, and the export has in consequence been much reduced. The greater portion of the interior of the Isthmus has been explored and the largest trees have been cut down. North of Panama, in the district of Chorera, there were once considerable numbers of trees, but these have been, to a great extent, demolished by the natives, who usually cut down the trees in order to tap or bleed them more easily.

The rubber saplings always appeared to grow most freely on the banks of little cool clear streams, the roots often running down to the edge of the water. They abounded also in deep rich soil along the base of the hills and in both deep and shallow ravines. Plants were likewise met with on the summits of the ridges, and in fact in all localities where there was no swamp or marsh land. Some plants were observed growing among masses of volcanic rock, where there was not much soil, but plenty of decaying leaves and praticles of *débris*. Prostrate trunks were observed on the way, some of which had attained to a great size.

Shortly after my first arrival I collected a few plants, which, with some stout pieces of the stems of saplings cut into lengths, I planted to experiment with. The greater number

prospered wonderfully, and some natives were surprised at the quickness of the result. I put the most advanced of these plants into a small box, and, although some lost a few leaves, yet I brought the best portion home alive.

In general, full-grown trees do not much exceed 160 to 180 feet, with a diameter of five feet and a produce of 100 pounds of rubber. The bark of the trunk is thicker than that of most trees of the same dimensions. The wood is spongy and soft, and decays rapidly wherever injured. The slender branchlets that crown the trunk terminate with four or five large leaves alternately arranged and thickly covered with short brown hairs. Many of the leaves measure 14 inches in length and 7 inches in breadth, and exceed in size those of any other tree of tropical America. According to the natives the leaves fall off the trees in January, after which they begin to flower. In April the new leaves push, and attain their full size in May. But I was assured that young plants and saplings retained their leaves throughout the year. The milk-like juice of the tree, which when congealed forms India-rubber, is obtained by cutting out a groove or ring of bark around the base of the trunk. The milk exudes from the bark into the channel thus formed, and large leaves are placed so as to receive it as it trickles down. The tree is then felled, and rings or channels are cut out around the prostrate trunk, at about twelve or fourteen inches apart. Beneath these leaves vessels are placed into which the milk flows. The contents of all the vessels are afterwards put in a hole previously dug in the ground. The milk left in this way becomes curdled in about two weeks. In the Republic of Ecuador most collectors use of the soft green stem of a Climber, a species of Ipomea, which, when bruised and stirred about in the milk, congeals it in a few minutes. By this last process the milk takes up all the watery particles it may contain, and the produce seemed to be of an inferior kind, possessing a strong peculiar smell, and continually sweating a black ink, like water. Soap is resorted to by some collectors, and also wood-ashes which contain potash. Collins mentions that alum is used in Brazil and salt in the east.

In collecting the milk, the *Combium* need not be hurt as the vessels which contain it really occur in the middle of the bark. Such at least is the case with the Darien-rubber tree.

The employment of any simple implement so formed as to make a groove in the bark to about one-half its thickness is all that is required.

Such an operation would require to be directed by an intelligent careful person, who thoroughly understands how much success depends upon the proper performance of the work. In this way not one single tree in a thousand would be lost, and the trees might, in my opinion, be operated on annually instead of once in three years, which I have been informed is the practice at Nicaragua.

The temperature of the forests in the interior of the Isthmus ranged from 75° to 88° Fahrenheit. Frequently I have observed the thermometer standing at 80° at eleven o'clock at night, and the same on various occasions at one and two o'clock in the morning. When there occurred a shower of rain accompanied by a north wind, the thermometer went down to 74° for one or two hours, but this was the lowest point to which it fell. I have not been able to ascertain to what altitude the tree grows as no high hills exist on the Isthmus, but I am pretty confident, from observations made while travelling on the Pacific Coast, that it ascends at most to an elevation of about 1,500 feet. At this height the lowest temperature experienced at any time throughout the year would be 62° or 60° Fahrenheit. As regards moisture I happen to have lived and travelled in various rubber districts where the rainfall varied considerably. On the Pacific Coast the tree grows near the Gulf of Guayaquil on flat or gently sloping land in deep deposits of a very sandy loam. The vegetation is moistened by humid fogs, but showers of rain very rarely occur. On the whole the atmosphere is unusually dry. At Esmeraldas the soil is a heavy loam or clay. There are about five months of dry or summer weather, and the remaining months are rainy.

In the neighbourhood of Buenaventura the tree is found dispersed over a broken and dislocated region of narrow ridges of nearly naked conglomerate with steep shelving ravines more than 1,000 feet in depth. Where there is soil it is loam or a kind of clay or made up of vast heaps of decomposing *débris*. The rains here are almost unceasing day and night throughout the year. This part of the coast and on as far as the river San Juan have been considered by intelligent travellers as the most unhealthy tract of country in the world.

The region proper of the Isthmus of Darien lying farther northward and including Portobello, Colon, Chagres, and Panama is very wet with an excessively damp atmosphere, although the weather is generally better, with some sunshine, during the months of January, February, March and April. The deposit of the low flat hills is more or less of a clay character, but along the banks of streams or rivers the deposit is mostly of rich but deep sandy loam. Many of the localities bordering on the Magdalena possess deep beds of sand and loam resting on a stratum of yellow gravel. The climate is often parched and dry. Rain falls in May, June, July and August. It will thus be seen that this rubber-producing tree is subjected to a variety of climatic conditions which might have been expected from the wide extent

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of country over which the species extends. These circumstances appear to me to present a favorable prospect for its successful cultivation in India.

A completely distinct species of tree whence rubber is likewise obtained was seen by me in a locality near the Gulf of Guayaquil. My attention was called to it by the native collectors, who spoke of the large size to which it grew. It has no branches, but simply pinnate leaves from three to five feet in length which form a large tuft on the top of the trunk like a gigantic grass tree. It seemed to be circumscribed to a limited extent of country.

The tree grows so rapidly that, once it is above the usual growth of weeds and shrubs, it is not likely to lie overtopped. The natives told me that in about four years young plants grew up to be trees. However, I think six years might be allowed for the development of a tree 16 or 18 inches in diameter. The produce of such a tree would then be 25 pounds. For a tree of this species, 18 inches in diameter, Collins gives a yield of 50 pounds of India rubber

As a tree becomes older its produce would increase; but, taking a plantation generally, it appears to me a safe calculation that each tree on an average would produce 25 pounds of rubber per annum.

A fairly-grown plantation, six years old, would be worth, at the lowest computation, £6 sterling per tree. I have made these remarks to show that, if the tree succeeds as I fully expect it will, no other tree or plant yet introduced into India will compare with it in the rapid and ample return it is likely to make to the planter.

Order thereon, 3rd May 1876, No 568.

Communicated to the Commissioner of the Nilgiris, who will ascertain and report the number of plants he would propose to plant at Burliar, and when and how they should be obtained from England.

(True Extract.)

(Signed) D. F. CARMICHAEL,
Secretary to Government.

WASTE LANDS ON THE NILGIRIS.

Proceedings of the Madras Government, Revenue Department, 5th May 1876.

Read the following papers:—

Proceedings of the Board of Revenue, dated 22nd March 1876, No. 816.

Read the following letter from J. R. COCKERELL, ESQ., Commissioner of the Nilgiris, to C. A. GALTON, ESQ., Acting Secretary to the Board of Revenue, dated Ootacamund, 2nd March 1876, No. 12:—

PARAGRAPH 7 of G. O., Revenue Department, dated 18th February 1876, No. 240, runs: "The Government resolve to consider whether a system can be framed to admit of the abandonment of the auction system, vesting in the Commissioner authority to dispose of individual applications subject to an appeal to the Board of Revenue, who will, therefore, with all practicable despatch, draw up a scheme of rules for this purpose."

2. Mr. E. C. Fraser-Tytler, a Retired Officer of the Bombay Civil Service, was recently on the Hills, looking out for land for his two sons who accompanied him. The latter await the result of an application for a block which Mr. E. C. Tytler made before leaving for England and which I have now the honor to submit for favorable consideration.

3. The land is forest land situated in the Mekenad Division and comprises 100 acres, which the Messrs. Tytler, junior, wish to open for tea. Their object is to secure the land at once in order that they may settle and build a house before the monsoon begins.

4. Mr. E. C. Tytler is a capitalist, and it seems very desirable that his sons should receive inducement to remain; and, as Government in the paragraph of the Government Order quoted above appear to have abandoned the auction system, I venture to suggest that the present application should be treated under Rule XXIII of the existing rules, which runs, "Nothing contained in these rules shall be held to debar the Government from granting waste land on putta, cowle, or otherwise at their discretion as heretofore," and that I should be authorized to hand over the land to Messrs. Tytler without delay on putta at the usual rate charged for estates.

5. The Deputy Conservator of Forests has visited the land and sees no objection to its alienation. I enclose Mr. Tytler's application with sketch, Major Jago's report, and the report of the Revenue Inspector.

6. In the Government Order above quoted it is stated, "The Committee apparently attribute the tardy occupation of the extensive waste lands on the Nilgiri plateau to the action of the present rules for their acquisition, and overlook the hindrance arising from unfavorable climatic conditions and the prevailing poverty of soil, which limit the field for planting operations and enhance the expenses of cultivating and maintaining estates."

7. With reference to this paragraph, I deem it important to inform the Government that there are ninety applications in my office, involving an approximate area of 7,000 acres, awaiting disposal under the new rules, and there are three applications in which areas are not stated. I am aware, moreover, that several other gentlemen are merely waiting for the abolition of auctions to apply for blocks of land.

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No. 324.

The Conservator of Forests sees no objection to the tract in question being sold.

(Sd.) R. H. BEDDOME, Lieut.-Col.,
Conservator of Forests.

MANANTODDY, *7th March* 1876.

ENCLOSURES Nos. 1 and 2.—Mr. Tytler's application.

ENCLOSURE No. 3.—Major Jago's report.

ENCLOSURE No. 4.—Report of Revenue Inspector.

Submitted for the favorable consideration of Government.

2. The Board see no objection to the grant of a putta as proposed, provided the applicant consents to abide by the conditions of the new Rules when determined on and to accept a Title-Deed under them. The revision of the Rules is now under consideration, and will be reported on shortly, but Mr. Fraser Tytler is anxious for a speedy disposal of his application, and the Board will not, therefore, defer its submission.

(A true Copy and Extract.)
(Signed) C. A. GALTON,
Acting Secretary.

Proceedings of the Board of Revenue, dated 1st April 1876, No. 902.

Read the following letter from J. R. COCKERELL, Esq., Commissioner of the Nilgiris, to C. A. GALTON, Esq., Acting Secretary to the Board of Revenue, through the Conservator of Forests, dated Ootacamund, 13th March 1876, No. 13:—

I have the honor to submit, for favorable consideration, an application from Mr. Richard Shubrick for a block of land at Nedivattum of 500 acres more or less in extent.

2. Mr. Knox, the Acting Assistant, has inspected the land. I know the spot. The land is almost entirely grass, and, under the existing rules, I could put it up to sale and hold an auction after three months' notice.

3. Mr. Shubrick, however, is anxious to secure the land at once under rules to be framed with reference to G. O., No. 240, dated 18th February 1876, Revenue Department.

4. I may state here that Mr. Shubrick is the only son of General Shubrick, who for a short time held the office of Commander-in-Chief of the Madras Army. He is possessed of capital, and is a desirable tenant for the Government to locate on the Hills.

5. If the land is not granted, Mr. Shubrick will lose a season as the southern monsoon is already near at hand. I need not remark on the evils of enforced idleness on a young gentleman desiring to settle on land in India.

6. There is a small hanging sholah on the land covering a few acres, but Mr. Shubrick will forego its acquisition at present, in order to obtain possession of the grass at once.

7. I would, however, suggest that he be granted the whole block under Rule XXIII of the Waste Land Rules, which runs:—

"Nothing contained in these rules shall be held to debar the Government from granting waste land on putta, cowle, or otherwise at their discretion as heretofore."

No. 394.

The Conservator of Forests sees no objection to the land in question being granted.

(Sd.) R. H. BEDDOME, Lieut.-Colonel,
Conservator of Forests.

OOTACAMUND, *24th March* 1876.

ENCLOSURE No. 1—Application of Mr. Shubrick.

ENCLOSURE No. 2.—Plan.

Submitted for the favorable consideration of Government with the Board's recommendation that a putta be granted, as proposed by the Commissioner, on the distinct understanding that the applicant agrees to be bound by any modification of the rules which may be determined upon.

(A true Copy and Extract.)
(Signed) C. A. GALTON,
Acting Secretary.

Proceedings of the Board of Revenue, dated 10th April 1876, No. 968.

Read the following Proceedings of the Madras Government, dated 18th February 1876, No. 240, Revenue Department:—

ABSTRACT.—*Waste lands on the Nilgiris.*—Passing orders on Proceedings, Board of Revenue, on the change of system in connection with the sale of—; requesting them to revise the Waste Land Rules generally with reference to this order; and desiring the Commissioner to convey the thanks of Government to the gentlemen who rendered assistance in the discussion of this subject.

In the foregoing order Government direct the Board to draw up and submit for consideration a scheme of rules somewhat on the model

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of those proposed in their Proceedings, dated 18th March 1870, No. 1,861, with a view to the abandonment of the auction system for the disposal of applications for waste lands on the Nilgiris. Two points are specially indicated as requiring consideration in connexion with this reference, viz., the propriety of placing a limit on the amount of land acquired by a single individual by requiring the planting of a certain proportion of each original holding before the submission of a fresh application, and the advisability of restricting applications, by which term it is presumed individual grants are meant, to an area less than 500 acres. The Board are also required to revise the Waste Land Rules generally with reference to the order.

2. The Board have revised the rules as directed, but before noticing in detail the points which call for settlement in connection with the revision, they venture to solicit the attention of Government to the correspondence which passed prior to the promulgation of the rules for the sale of waste land in this Presidency as they now stand, as it seems to them open to question whether such a departure from the principles laid down in the Secretary of State's despatch, dated 9th July 1862, No. 14, as is now proposed, can be carried out without the sanction of the Secretary of State. The letter quoted at paragraph 6 of the Order of Government, dated 24th September 1862, No. 2,080, as excepting the Nilgiris from the operation of the rules, appears to have related exclusively to the rates at which land on the Nilgiris was to be disposed of, and would seem not to have authorized a departure from the principles laid down in the Secretary of State's despatch in other respects.

G. O., 24th September 1862, No. 2,080.

3. The superiority of the auction system for the settlement of conflicting claims has been repeatedly recognized, and the Board would call attention to the marginally-noted passages from communications addressed by this Government to the Government of India advocating its adoption in all cases. The late Commissioner in his letter of the 7th May 1870, recorded in G. O., dated 22nd September 1871, strongly urged the retention of the system as fairest to all concerned, and the Board appear to have been led by his arguments to modify the opinion they had previously expressed in their Proceedings of the 18th March 1870 as to the feasibility of the change of system they had proposed. The Committee have not noticed the difficulties in the way of the settlement of rival claims and of securing that the preferential claims of neighbouring landholders shall be duly considered in the disposal of applications for land contiguous to their holdings, and the Board question whether it would not be advisable to retain auction sale for the settlement of rival claims as was originally proposed in the Resolution of the Government of India even should the abandonment of the auction system in ordinary cases where no rival claimant appears to be decided upon; competition being, however, limited to rival claimants and not being open to the general public.

Paragraph 4, Clause 3, letter dated 25th February 1862, No. 395.

Paragraph 2, letter dated 22nd July 1862, No. 1,572.

Paragraph 30.

4. As regards the vexatious delay which is laid to the charge of the auction system, the Board observe that the fact that by Section 1, Act XXIII of 1863, three months' clear notice must be given in advertising the sale or other disposition of waste lands on account of Government has been overlooked. The Act is general in its terms, and, though the Bill was originally framed with reference to the rules for the sale of unassessed waste in fee simple, the Nilgiris have not, as far as the Board are aware, been exempted from its operation. The only papers relating to the Bill when under discussion traceable in the Board's Office are G. O., dated 27th September 1862, No. 2,109, communicating copy of the Bill and letter from the Supreme Government relating thereto, and the Board's reply, dated 2nd October 1862, No. 6,646. The Board took exception to Section 17 of the Bill, and suggested that an order should be passed excepting the Nilgiris from the operation of the recently prescribed rules and of the law passed in furtherance of those rules. The Bill was considerably modified and Section 17 struck out, but no order excepting the Nilgiris from the operation of the rules and Act was issued as far as the Board are aware, and they, therefore, conclude that the Act does apply to the Nilgiris. The abandonment of the auction system will consequently not obviate the necessity for deferring the disposal of applications until the lapse of the time fixed by the Act, and the Board believe that a period of three months suffices for all the preliminaries under an auction system as pointed out at paragraph 15 of their Proceedings of 13th October 1875.

5. The Board will now proceed to notice the points calling for settlement in the revision of the rules. The direction to "revise the Waste Land Rules generally" with reference to the Government Order under reply has been understood to apply only to the Nilgiri Rules, as the order does not affect the system for the disposal of land elsewhere.

The following points seem to require notice:—

1*st.*—Whether any price should be charged additional to the cost of demarcation and survey.

2*nd.*—The advisability of a limitation of the area of grants.

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3rd.—The question of placing a limit on the extent of holdings by requiring a certain proportion to be planted up before the acquisition of fresh land.

4th.—The extent to which adjacent landholders should be held to have a preferential claim.

5th.—The disposal of timber on land granted under the rules.

6th.—The mode of disposal of applications for building lots within the limits of the settlements of Ootacamund, Coonoor, and Kotagherry.

7th.—The disposal of auriferous tracts.

6. As regards price, the Committee propose that the cost of demarcation and survey at a uniform rate of Rupees 2 per acre should be the only charge. In paragraph 16 of their Proceedings of the 13th October, the Board took this proposal as contemplating that the deposit should be made at a fixed rate, but should be subject to subsequent adjustment of any excess or deficiency on ascertainment of the actual cost. The meaning of the rule is not very clear, but it is apparently intended to provide for a charge or refund only in the event of a discovery of a difference between the estimated and actual areas by survey, the acreable cost not being taken into consideration. In their Proceedings of the 18th March 1870, the Board proposed that a fixed rate of Rupees 5 per acre, or Rupees 6 for forest and Rupees 4 for grass, should be charged, including cost of demarcation and survey. The Board are not aware what the average of the prices realized and of the survey charges has been, the Commissioner not having as yet submitted the statement called for in paragraph 11 of the Proceedings of the 13th October 1875, but the fixed rate proposed in 1870 is probably considerably in excess of the average; and as the Board have every desire to lighten the burden upon the planters, and heavy charges imposed at the outset press more severely than those which descend only after the lapse of some time, in that they curtail the means available for clearing and cultivation, they think it will be sufficient to charge the actual cost of demarcation and survey, the estimated cost, say at the rate of Rupees 2 per acre, being deposited at the time of application. There is no objection to a fixed rate for deposits, but a uniform charge of Rupees 2 per acre would not be fair, as the cost of survey varies so greatly according to the nature of the locality—*vide* paragraph 8 of Mr. Breeks' letter of the 7th May 1870.

7. The second question, viz., the advisability of a limitation of the area of the grants, must be considered in connection with the third, viz., the propriety of requiring that a certain proportion of each original holding be planted up before a fresh application can be entertained. Under the existing rules blocks of 500 acres are prescribed, and several contiguous blocks, each not exceeding that limit, may be applied for. The Committee proposed the abolition of this restriction as to the size of the blocks, but the Board pointed out that, if the system of auction is to be retained, the size of the lots must be limited. Now that the abolition of the auction system is proposed, it becomes necessary to consider whether land-jobbing can best be checked by a limitation of the aggregate area to be assigned to each individual, or by requiring that a certain proportion of each holding shall be planted up within a definite period. The present limit to the size of the blocks seems suitable; any reduction would only increase the acreable cost of demarcation and survey where several contiguous lots are applied for, and as long as it is open to an applicant to take up as many lots as he pleases, a mere alteration of this limit would not be effectual. The limitation of the aggregate extent of land which each individual may acquire, with a view to check speculation, is open to the objection that any such regulation can be easily evaded by putting in applications in the names of relatives and friends. Moreover, it would be difficult to fix a limit suitable to the varying means of intending settlers so as not to check unduly legitimate enterprise. The only feasible plan, therefore, appears to be to require that a certain proportion of each holding shall be planted up within a certain period as a guarantee of *bonâ fides*. The proposal to require compliance with this condition in respect of previous grants before the submission of fresh applications does not commend itself to the Board, as it would debar planters in a position to extend their operations from doing so.

8. At paragraph 18 of his letter, recorded in Board's Proceedings, dated 18th March 1870, the late Commissioner recommended that the postponement of the Government demand should be conceded subject to a proviso that at least a third of each estate should be planted up with 500 plants to the acre within the first four years, and in default that the whole estate should be liable to payment of the full assessment from the date of purchase. It appears from paragraph 7 of the same letter that a similar condition is imposed in Travancore, and the Board consider that some such stipulation is fair and necessary in the interests of Government. To prevent, as far as possible, land being taken up for purposes of speculation and abandoned before the assessment falls due, the grantee should bind himself to cultivate a specific portion, say one-fourth of each grant, within the first five years, failing which the full assessment should be levied from the date of the grant. Of course, this stipulation will not absolutely secure Government against all risk of loss, but, coupled with the proviso that

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no refund of the deposit will be made in the event of the application being withdrawn as proposed by the Committee, the risk will be as small as circumstances will admit of. The prohibition of the Government of India at paragraph 14 of the Resolution of the 17th October 1861 against the imposition of any such condition had reference to sales of land in fee simple, and the objections to the restriction have not the same force in respect of land held subject to annual assessment. The Board consider that some stipulation of the sort is absolutely necessary if auction sale is to be abandoned.

9. The Board cannot support the Committee's proposal that the assessment should be levied only on the cultivated area; the assessment should be levied in the sixth year on the entire holding. The Committee's proposal involves the necessity for periodical inspections, to which there are great objections, and the system was disapproved of by the Secretary of State in his despatch embodied in G. O., dated 5th October 1863, No. 1,810. General and local taxes should be payable from the date of the grant, notwithstanding the postponement of payment of the assessment.

10. *4th.*—As regards the extent to which adjacent landholders should be held to have a preferential claim, and the mode in which this right is to be secured. This point presents one of the chief difficulties in the way of the abolition of auction. The Government of India orginally directed the reservation of blocks of land adjoining grants at the grantee's request for future occupation, but the auction system was prescribed and secured the rights of adjacent landholders by enabling them to secure land adjoining their properties by outbidding the applicant. In their Proceedings of March 1870, the Board suggested the following general rule for the settlement of claims preferred by the holders of adjacent estates, viz., that they were to have the option of taking the land applied for "should it be so situated with reference to communications, water, &c., as seriously to affect their plantations." The late Commissioner, in his letter of the 7th May 1870, pointed out the difficulties in the way of deciding how far the interests of existing estate owners will be affected by the grant of particular sites to others, but they have not been noticed by the Committee, who apparently ignore the claims of adjacent landholders. On a full consideration of the whole subject, the Board are of opinion that the instructions proposed in 1870 were too general and virtually left the decision of a very difficult matter to the Commissioner. Whilst admitting that cases may arise in which a neighbouring landholder should have the preference, the Board do not see their way to laying down any definite rule on the subject, and they do not consider it fair to throw the whole responsibility on the Commissioner. They are therefore of opinion that priority of application should decide rival claims; in the event of two or more simultaneous applications, *i.e.*, during the same day, the decision should be left to the discretion of the Commissioner and a neighbouring landholder should have the preference. The rights of the hill tribes must of course be respected; but with the present favorable rules as to payment of assessment, there is no hindrance to the acquirement by estate owners of adjoining lots which they are likely to require in the future and they must be left to protect themselves. To vest the Commissioner with discretionary power for the decision of conflicting claims subject only to the broad rule for his guidance already adverted to would, the Board fear, lead to as much disappointment and dissatisfaction as has resulted from the auction system in other respects.

11. *5th.*—As regards woodlands, the Government have decided that where such are granted the seigniorage is to be paid on the wood and peat removed *for sale;* the seigniorage on the latter being, it is presumed, the rate leviable on firewood. In their Order, dated 14th July 1869, No. 2,041, the Government approved certain rules* framed with the view of securing that the Forest Department should receive the value of timber standing on all grants of land. These rules are not noticed by the Committee, but the Board understand that they have rarely been acted on. As the Commissioner is, in communication with the Conservator, to have all necessary reservations defined, there is sufficient security that land containing timber having a saleable value will not be alienated, and as no charge is to be made for wood consumed by the planter himself, the rules contained in Standing Order No. XXVIII of 1869 will not be embodied in the revised rules for the Nilgiris. The Board consider that seigniorage should also be charged on wood and peat removed for consumption beyond the limits of the estate, for other than *boná fide* estate purposes.

* Board's Standing Order No. XXVIII of 1869.

12. The question of sale of building lots within the stations next demands consideration. The Committee's revised rules are not to be held applicable to building lots within the settlements as laid down in the Revenue Survey Maps. The auction system must of course be retained for the disposal of applications of this nature, and to obviate the necessity for two different sets of rules and forms of deed, the Board suggest that building lots be put up in freehold under the general waste land rules at an upset price equal to 25 years' purchase of the assessment, viz., Rupees 25 per acre, in addition of course to the cost of demar-

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cation and survey. This is in accordance with the rules of 1859, when building sites were sold at an upset price of Rupees 20 per acre, *i.e.*, 20 years' purchase of the assessment, not Rupees 2 as twice stated in the Committee's report. As the area of the lots is trifling, the requirement to pay the capitalized value of the land will not be burdensome. The Board understand that G. O., dated 22nd September 1871, reducing the rent of grazing land from Rupee 1 to Annas 8 per acre, has been applied to building lots within the stations. The Board consider that from the wording of the order in question the concession was intended clearly to apply only to grazing land, and no more lots should be sold at the lower rate until the orders of Government on this point are issued.

Vide paragraph 3, G. O., dated 6th December 1862, No. 2,554.

13. The next point is the disposal of auriferous tracts. As one or two applications to prospect on the Nilgiris have been made and the revision of the rules is under consideration, the question of modifying the form of deed under which land is held so as to secure the rights of Government requires notice. The Board have already submitted their views in reply to a reference regarding such tracts in the Wynaad, and suggested that a special maximum limit of 100 acres should be prescribed, and that provision for the levy of a royalty should be made in the deed. In reporting on the question, the Board overlooked the fact that the Government of India originally intended that the deed should convey all rights of mines, and that they subsequently expressly ruled that waste lands believed to contain mineral wealth should not be either sold or leased as waste land for agricultural purposes, but should form the subject of special agreement. The draft Rules, therefore, will contain a clause that applications for lands supposed to contain mineral wealth should not be disposed of under the Waste Land Rules, but reported for orders.

Board's Proceedings, dated 20th December 1875, No. 3,384.

Paragraph 12, Resolution, dated 12th October 1861.

Resolution embodied in G. O., dated 3rd April 1867, No. 779.

14. The Board have now noticed all the points which appear to call for settlement in connection with the revision of the rules, and have modified them in accordance with the conclusions at which they have arrived. The forms of deed should, the Board consider, be redrawn by the Law Officers of Government. Forms X and Z must be altered to suit the new conditions. Forms U, V, and Y may be dispensed with, and a simple advertisement of the particulars of land applied for substituted for Form W. Form T embodied in Board's Proceedings, dated 6th October 1864, No. 6,562, which was drawn up to meet a difficulty experienced at the outset in getting lots surveyed, in consequence of which the sale of waste before survey was permitted under certain conditions, and which may still be required in the event of the alteration of the rules leading to a great increase in the number of applications, must be redrawn.

G. O, dated 28th February 1863, No. 439.

15. With reference to paragraph 8 of the order, the Commissioner will, as directed by Government, take immediate steps in communication with the Conservator of Forests, to have all necessary reservations of woodlands, grazing lands, and swamps defined and marked on a map. With reference to the Board's proposal to retain special report in the case of applications for forest land on the slopes, they gather it to be the intention of Government that the Commissioner should decide, subject to such future revision as may from time to time appear necessary, what portions of the slopes are to be reserved, and that the remainder is to be open for allotment without further reference to the Board or Government. Until the map has been approved by Government special report in the case of woodlands must of course be retained. The Commissioner will note that the main direction of necessary roads and water channels should, as far as possible, be settled at the time of survey.

16. As regards the introduction of Tope Rules suitable to the requirements of the district and the rapid growth of Australian trees, the Commissioner will report, with as little delay as possible, on the working of the rules sanctioned in G. O, dated 30th July 1869, No. 2,228, providing for the grant for firewood plantations of blocks not exceeding 50 acres, rent-free for seven years, subject to confirmation at the expiration of that period by the issue of a title-deed on payment for the future of an annual assessment of Rupee 1 per acre, or to resumption, if not fully planted up. The Board believe that advantage has not generally been taken of the concession then made, and consider that the rules now proposed render the introduction of any special Tope Rules quite unnecessary.

(A true Extract.)

(Signed) C. A. GALTON,

Acting Secretary.

RULES.

For the disposal of Waste Land on the Nilgiri Hills passed by His Grace the Governor in Council on the

I. Waste lands in which no rights of private

proprietorship or exclusive occupancy exist, and which may not be reserved as hereinafter* provided, may until further notice be granted under the following rules.

* Rules 16 and 17.

II. Applications for land under these rules shall be addressed to the Commissioner of the Nilgiris and shall comprise the following particulars:—

(a). The estimated area of the land applied for.

(b). The situation of the land and its boundaries as accurately as can be stated.

III. No lot shall exceed 500 acres unless otherwise specially ordered by Government; but any person may apply for several contiguous lots, each not exceeding the above limits.

IV. Every lot shall be compact and as nearly as possible a parallelogram. When the land touches any road or river the length of the road or water frontage shall not exceed one-half of the depth of the lot, and in all other cases the blocks will be so laid out that, as far as practicable, their length shall not exceed half their depth, provided that the Board of Revenue may, on special cause shown, permit a relaxation of these restrictions—*Vide* G. O., dated 22nd September 1871, No. 1,656.

V. No lot shall ordinarily be granted until it has been surveyed and durable boundary marks have been erected at the expense of the applicant.

VI. If on receipt of an application under Rule II the Commissioner has reason to believe that no objections exist to the grant of the land, he shall call upon the applicant to deposit with him the estimated cost of surveying the land and of marking it out with durable boundary marks, calculated at the rate of Rupees 2 per acre on the area applied for. The Commissioner will refund to the depositor any portion of his deposit which may not be actually expended in the survey and demarcation, and the depositor shall pay any deficiency.

VII. If the applicant fail to deposit the sum required under Rule VI within one month from the date of demand, his application shall be null and void.

VIII. On receipt of the deposit required under Rule VI the Commissioner shall, as soon as possible, cause the land applied for to be surveyed and marked out, and shall exclude from the lot all excess which may be found on survey beyond the limits prescribed in Rule III, and shall issue a notification of the intended grant in the Form W prescribed, so as to admit of the notice required in Rule IX being given.

IX. The notification, which shall be in English, Canarese, and Tamil, and shall specify the locality, extent, and boundaries of the lot, shall be posted for three clear months on the land itself as well as in the neighbouring villages, in the offices of the Commissioner, Joint Magistrates and Deputy Tahsildar, and at the nearest Police office; a copy shall also be inserted in the District Gazette, and no allotment shall be made until the intended grant has been advertised as aforesaid for three full months.

X. On receipt of an application for land under these rules, the Commissioner shall hold a preliminary inquiry, and if he sees reason to believe that claims will be put forward for the land applied for, or if any claim of private proprietorship or of exclusive occupancy, or of any other right incompatible with the grant of the land under these rules be preferred to the land or any part of it, he will hold the application in abeyance pending the result of such inquiry and the disposal of the counter-claims in due course of law, and the applicant will at once be informed of the objections to the immediate disposal of his application. Should the applicant, however, prefer that the survey should be proceeded with at his risk, the same will be done, and if after the survey it should prove that the lands cannot be granted under these rules, the applicant must pay the expense of surveying them, as well as of surveying any excess beyond the limits prescribed in Rule III. If no such warning be given, and the land should eventually prove not to be available, the survey will be at the expense of Government.

XI. An applicant withdrawing his application after the deposit has been made, shall not be entitled to a refund of any portion thereof, and another applicant applying for the same land shall be liable to pay the cost of demarcation and survey, and shall make the requisite deposit on account thereof, notwithstanding that the survey and demarcation may have already been performed partly or wholly at the expense of the former applicant.

XII. The first applicant shall ordinarily be the grantee. In the event of two or more simultaneous applications for the same land (*i.e.*, during the same day) being preferred, the Commissioner shall exercise his discretion in making the allotment, the holder of an adjacent estate, if one of the rival claimants, being entitled to the preference, and his decision shall be accepted subject, however, to the appeal allowed by Act XXIII of 1863, of which notice must be given within one week, whereupon effect will not be given to the Commissioner's award until a final decision has been passed on the claim in due course of law.

XIII. If there be no objection to the grant

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of the lot applied for, or when final orders on any rival claims which may be preferred have been passed as aforesaid, the Commissioner shall, as soon as the period of notice prescribed by Rule IX has expired, proceed to put the successful claimant in possession by furnishing him with a written declaration of the grant in the Form U annexed, and the grantee shall, as soon after possession is given as possible, be furnished with a title-deed in the Form X annexed to these rules, provided that possession shall not be given until completion of demarcation and survey except under the following circumstances: — Should the Survey Department be unable to undertake the survey within a reasonable time the Commissioner may, with the previous permission of the Board, give possession on the applicant binding himself by a written deed in the Form T annexed to these rules to conform thereto, to pay any survey expenses incurred in excess of the deposit and to abide by the decision of Government as to any excess which may be found in his lot on survey, whether that decision be the absolute resumption of the excess without any refund or reduction of survey deposit, or whether it be the inclusion of the excess in the lot. The assessment payable on the land will in all cases be regulated by the extent of land made over to the applicant. No lot shall be made over until durable boundary marks have been set up. On completion of the survery a title-deed in Form X shall be issued in lieu of that in Form T.

G. O., dated 28th February 1863.

XIV. Land disposed of under these rules shall be free of assessment for the first five years from the date on which possession is given by a declaration in writing of the grant, and the land shall thereafter be subject to an annual assessment payable on or before the 30th June of each and every year at the rate of Rupees 2 for each acre of forest land and 8 Annas for each acre of grass land, provided the grantee binds himself to plant out, before the expiration of the fifth year, at least one-fourth of the whole extent of each and every grant, failing which the assessment will be leviable from the date of the grant. The system of planting adopted, the number of trees to the acre, and their position in relation to each other, must be such as will satisfy the Commissioner that the land has been obtained *bonâ fide* for the purpose of cultivation.

XV. A grantee under these rules shall not be at liberty to dispute the correctness of the survey after it has been completed on any grounds whatsoever, as, by accepting the declaration of grant, he shall be considered to have waived all objections to the description of the premises or other error in the particulars of the property as exhibited in the map.

XVI. Reserves of grazing and forest land, of land for the growth of firewood, for building sites, parks, recreation grounds and the like, and of land required for other special purposes, shall not be granted under these rules without the express sanction of Government. A register and map of such reserves will be maintained in the Commissioner's office, and will be open to inspection by intending applicants at such times and under such rules as the Commissioner may prescribe by notification in the District Gazette. It shall be open to Government to revise the register and map at any time and to add to the reserved tracts such lands as it may deem desirable so to deal with.

XVII. Grants of forest land under these rules shall be subject to the reservation of a belt of wood fifty yards wide round the sources of springs and streams and along both banks of all streams, and of a band 100 yards wide on either side of all ridges clothed with forest. In case of dispute as to the necessity for retention of a belt the Commissioner's decision shall be final.

XVIII. All timber or firewood from natural wood cut on land granted under these rules removed for sale, or for use beyond the limits of the estate for other than *bonâ fide* estate purposes, shall be charged the usual rates of seigniorage payable on similar timber or firewood removed from forests under conservancy and shall be removed only under a Forest pass. Similarly seigniorage will be charged on peat removed from the land for sale or for consumption beyond the limits of the estate for other than *bonâ fide* estate purposes.

XIX. The annual assessment on lands granted under these rules may at any time be redeemed by the owner on payment of a sum equal to twenty-five times the said annual assessment, and the lands so redeemed shall thereafter be for ever free from all demands on the part of the State on account of land revenue. On payment of the redemption money the owner of the land shall be furnished with a deed in the Form Z annexed to these rules.

XX. Arrears of annual assessment shall be recoverable in the same manner as arrears of Ryotwary Land Revenue are, or may be recoverable by the law for the time being in force in the Madras Presidency.

XXI. Lands granted or redeemed under these rules shall nevertheless become from date of grant and continue subject to all general taxes and local rates payable by law or custom, and the postponement of the demand of land assessment shall not be held to include exemption from general taxes and local rates.

XXII. The existing and customary rights

of Government, of other proprietors, and of the public in existing roads and paths, and in streams running through or bounding lands granted under these rules, are reserved and in no way affected by the assignment of such lands under these rules. The main direction of necessary roads and water channels shall, so far as possible, be settled at the time of survey and the land will then be made over subject to the maintenance of existing rights of way and water.

XXIII. Nothing contained in these rules shall be held to debar the Government from granting waste land on putta, cowle, or otherwise at their discretion as heretofore.

XXIV. These rules do not apply to lands situated within the limits of the settlements of Ootacamund, Coonoor, and Kotagherry, or to the Wellington Cantonment as defined on the Revenue Survey map. Building lots within those stations not exceeding ten acres in extent, to the alienation of which there may be no objection, shall be sold in freehold under the general rules for the sale of waste lands passed by the Honorable the Governor in Council under date the 5th March 1863, and numbered 476, at an upset price of Rupees 25 per acre *plus* the cost of demarcation and survey.

XXV. When waste lands contain, or are believed to contain mineral wealth, they shall not be disposed of under the Waste Land Rules nor leased, but must form the subject of special agreement. On the receipt of applications of this nature the Commissioner will report to the Board for orders instead of proceeding under the Waste Land Rules. Nothing in these rules shall be held to debar Government from levying any royalty on the produce of mines to which they may be legally entitled.

Standing Order No. 151-2.

Subsidiary Instructions relating to the disposal of Waste Lands on the Nilgiris under the Rules dated

The Commissioner shall carefully and punctually maintain a register and map of tracts reserved from the operation of these rules as being required for forest purposes, for grazing or firewood reserves, for building sites or for any other public object. The register and map shall be available for reference by intending applicants for waste land on application at the office of the Commissioner. The Conservator of Forests will be consulted by the Commissioner in regard to forest tracts which it may be desirable to reserve, and the orders of the Supreme Government on this point as contained in paragraph 4* of Standing Order No. 151 will be kept carefully in view.

* Under orders from the Secretary of State, if forests contain valuable timber, more especially teak, such forests must not be disposed of under the Waste Land Rules, but must be worked by Government under the Forest Rules. Great caution should be exercised by Collectors in the disposal of all Forest lands, and they should bear in mind the want of sleepers for Railways hereafter to be constructed, and the demand for firewood by the general public.

2. Immediately on receipt of an application for waste land, the Commissioner shall ascertain whether there is any objection to the grant, or whether any special limitation is necessary by reason of the land being required for public purposes.

3. Where no such objections are known to exist, the Commissioner shall give instructions for the demarcation and survey of the land without delay, and shall simultaneously issue the prescribed notification, *carefully observing Rules 8 and 9*. All notices of the intended grant of lands described as lying 'contiguous to,' 'or in the vicinity of,' other lands, the property of individuals named should be transmitted to each of those individuals or to the reputed proprietors of such adjacent lands to afford them an opportunity of objecting to the grant and to guard against any inadvertent encroachments on their property.

4. Should any objection or counter-claim be made, the Commissioner should proceed at once to inquire into the merits of the case. Rival claims shall be decided by priority of application, and in the event of two or more simultaneous applications for the same land, *i. e.*, during the same day, the decision will be left to the discretion of the Commissioner. Should one of the rival claimants be the holder of a contiguous estate, he shall be held entitled to the preference. Where objections are raised by Badagas, Todas or Hillmen, land should not be granted to planters if it is in such close proximity to the villages of the former as injuriously to affect their convenience as regards cultivation or pasturage.

5. A separate register of all grants under

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the rules shall be kept in the Commissioner's Office in English in the following form:—

Number of Lot.	Name of Grantee (in full).	Division and Village in which Land is situated.	Name and Boundaries of Lot.	Area of Lot.	Annual Assessment.	Date and Number of Deed of Grant.	Special Reservations, if any.	Subsequent registered Transfers or Successions.

6. The original maps or plans and survey records of all such lands shall be kept in a series corresponding with the number in this register, and shall be signed by the Commissioner.

7. The deeds are to be executed in duplicate, and, after being properly filled up and signed, submitted through the Board for the seal of Government. When returned, one copy is to be delivered to the grantee, and the other carefully preserved by the Commissioner in a safe provided for the purpose.

8. The receipts at the foot of the several deeds are to be signed by the Commissioner.

9. The lots must be consecutively numbered in the order of the grants, without reference to locality, and the deeds must bear corresponding numbers.

10. The plans to accompany the deeds must be signed by the Commissioner and securely attached to the deeds; they must be numbered to correspond with the deeds, and all plans, whether attached to the deeds or upon it, are to be attested by the Commissioner separately.

11. All reserves, whether of streams, roads, rights of way, wood or any other rights, should be clearly shown in the survey plan, being therein detailed and exhibited in some distinctive color. The Commissioner should furnish the Survey Officer with the necessary information on these points, and the area occupied by the reserves should be distinctly excluded from the blocks assigned, the assessment on the area reserved being in all cases deducted from the aggregate assessment of the entire block. As it is essential that grantees should know exactly what their rights will be (the general reservations in the deeds being applicable only to reserves which from any cause cannot be declared at the time of grant), the Commissioner will be careful to see that all reserves, such as those described above, are clearly entered on the maps before submitting them to the Board.

12. Copies of the rules should be kept at the Commissioner's Office and supplied to the Deputy Tahsildar, Coonoor, for sale to the public at 4 Annas per copy.

13. All grants of waste land made under the rules on the Nilgiris shall be reported quarterly to the Board of Revenue.

(Signed) C. A. GALTON,
Acting Secretary.

Order thereon, 5th April 1876, No. 579.

The Board of Revenue will be informed that any modifications of the present rules which His Grace the Governor in Council may determine to be advisable will probably demand a reference to the Secretary of State; and cannot, in any case, be promulgated for some considerable time. The Commissioner of the Nilgiris should therefore be instructed to call upon Messrs. Fraser-Tytler and Shubrick and other applicants for lands to state whether they are content to have their applications treated as if made under the existing rules. If they decline doing so, their applications will be returned to them. The Governor in Council entirely declines to give them the lands applied for, on the understanding that they will abide by some future new rules, whatever they may be; and he further desires it may be clearly explained to these gentlemen that the fact of their having lodged their applications in anticipation of the appearance of some possibly more favorable rules does not place them in a better position than applicants who may come forward on any change of rules.

(True Extract.)

(Signed) D. F. CARMICHAEL,
Secretary to Government.

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MISCELLANEOUS.

INDIAN MORPHIA.

India produces two kinds of opium, of which one is unfit for the manufacture either of morphia, laudanum, opium powder, or tincture of opium. This is the drug which is grown by the Government under monopoly, for the Chinese, who smoke opium, but do not eat it. On the other hand, the entire Sikh nation including the *Jats*, and nearly all Rajpoots, eat a certain quantity of the drug daily but do not smoke it.

The second description of opium is grown in the Hills, and is an exceedingly hardy plant. It withstands snow, sleet, and the hardest frost. The poppy is black and white flowered, and the pods are ready for bleeding in April and May. The opium produced from this plant contains seven per cent of morphia, and is used for all medicinal preparations, but being deficient in narcotine is unfit for smoking, though well adapted for eating. Now the London price of morphia is seldom below twenty shillings per ounce of 437½ grains, and as India could supply morphia from the plant at a much lower rate, its production as an article of export is perhaps deserving of attention.

The first difficulty to be overcome is to convince the authorities, that the cultivation of a particular kind of European poppy (whose opium from its extreme richness in morphia, is unfit for smoking purposes,) would in no way interfere with the revenue or prove injurious to the population of the Hills.

It might easily be enacted that all *morphia opium* should be sent under permit to Calcutta. Wherever coffee and tabacco thrive, the poppy will. On the Nilgiris and the Hills from Kangra to Darjeeling, the morphia poppy would grow as luxuriantly as the indigenous plant.

It is well known that the best Indian opium is inferior to the Turkish. It yields but 3½ per cent of morphia, while Himalayan opium as analysed by Dr. Mactier gave 7 per cent. In England the dearness of labour and the climate are opposed to the profitable cultivation of opium, but in France it has been found that poppy seed alone will pay for the cost of culture independently of the capsules, and poppy cultivat ionwas looked on with favor, but from some cause or other does not seem to have progressed. In Germany, the opium collected from the white poppy (*album*) yielded only 7 per cent of morphia, while the black variety (*nigrum*) yielded 16½ per cent. Fifty chittacks of such opium costing say 10 Rupees per seer or Rupees 33-10-0, should yield eight chittacks of morphia worth £16.—*The Indian Agriculturist*, Vol. I, p. 97.

THE CULTIVATION OF OATS.

To produce first class Oats from imported seed for conversion into Oatmeal in India, it is necessary to supply the cultivator with practical information on the subject of oat culture. The botanical name of the cultivated oat is "*Avena Sativa.*" Of this there are many varieties, the chief of which are *Avena Sativa alba* or White Oats, *Avena Sativa Nigra* or Black Oats, *Avena Nuda*, or Naked Oats, Pill, Pilcorn, *Avena Strigosa* or Spanish Oat, also called Thistle pointed Oat.

In England, the grain is used to feed horses, fourteen pounds by the day being the usual allowance; but hard-worked horses need not be stinted. To cause the oats to be thoroughly digested, they should be well wetted with water holding culinary salt in solution. One hundred ounces, or four beer bottles, of water require two and a half ounces of common salt, to make the solution of the requisite strength, and for over seven seers of Indian oats this is not too great a quantity. If the oats are not so wetted with salt water, a great part passes unchanged through the horse's stomach.

The *A. nuda* is considered the best for making groats; the White and Spanish yielding the best oatmeal.

Professor Vogel found that 100 parts of oats afforded 66 parts of flour or meal, and 34 parts of bran; but this proportion would depend upon the quality of the grain. The oatmeal contains 2 parts of a greenish-yellow fat oil; 8·25 of bitterish sweet extractive; 2·5 of gum; 4·30 of a gray substance, more like coagulated albumen than gluten; 59 of starch; 24 of moisture (inclusive of loss). Schroder found in the ashes of oats silica, carbonate of lime, carbonate of magnesia, alumina, with oxides of manganese and iron.

The nourishing powers of oats are 75, barley being only 50, while beans are 100 and peas 80. Hence it follows that a horse fed on oats and beans, receives 175 of nourishment, whilst the same quantity of the best barley and peas will yield only 130 of nourishment, yet with these well established facts staring us in the face, bean culture, in the plains, as a field crop is unknown, and oats are chiefly grown in stud districts, partly by zemindars, and partly on stud lands. The oat crop takes a considerable amount of mineral matter out of the soil, and as these are poorly represented in the old stud districts, the produce must of necessity have been of very low quality, the assertion being established by the thousands of undersized costly colts and fillies periodically sold to the public for just what they would fetch at auction.

According to Professor Johnston, one hundred pounds weight of oat-ashes were found to

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contain of potash and soda, lbs. 26; of lime lbs. 6; of magnesia lbs. 10; of oxide of iron lb. ½, of phosphoric acid lbs. 44, of sulphuric acid lbs. 10½, of chlorine lb ¼, of silica lbs. 2¾, total 100. The European agriculturist will not fail to observe the large quantity of sulphuric acid present against the small quantity of iron, and to supply this artificially by addition to the manure, the use of the sulphate of soda,—another mineral manure kept out of use by the Salt Department—is indispensable. A study of the analysis given below will show what the oat takes out of the soil, and how it may be restored. According to Professor Balfour of Edinburgh " In 1,000lbs. of the grain of the oat, are contained 25·80lbs., and of the dry straw 57·40lbs. of inorganic matter, consisting of

	Grain.	Straw.
Potash	1·50	8·70
Soda	1·32	0·02
Lime	0·86	1·52
Magnesia	0·67	0·22
Alumina	0·14	0·06
Oxide of Iron	0·40	0·02
Oxide of Manganese	0·00	0·02
Silica	19·76	45·88
Sulphuric Acid	0·35	0·79
Phosphoric Acid	0·70	0·12
Chlorine	0·10	0·05
Total lbs. ...	25·80	57·40

Now as 1,000lbs. of wheat produce only lbs. 11·77 of ash, and 1,000lbs. of wheat straw 35·18lbs. of ash, the difference lbs. 14·03, and lbs. 22·22 respectively, show that the empiric agriculturist, whether a ryot, a zemindar, or a commissioned stud officer, must come to grief, if they enter on oat cultivation without a practical knowledge of Scientific Agriculture as taught in every " Boys school," in Germany, Holland, Flanders, Italy, Sweden, Poland, North and South America, to a great extent, and also in various selected parts of Russia, but entirely ignored in Bengal, Behar, the North-Western Provinces, and the Punjab. In place of the educated generation of Hindoos being trained to look upon agriculture as an honorable avocation, they despise it as being beneath Aryans, unconscious of the fact, that the ancient word " Ar," means plough, and " Jun," or " Yun" *Man*. Hence " Arjun" or " Argun" means an Agriculturist, or cultivator of the soil, as contra-distinguished from " Gaon," village, " Ar," plough, whence comes, " Gaon-ar," a rustic or villager, anciently a serf.

To return: it cannot be too widely known that in a country like India where good beaf and mutton are scarce, oatmeal cake and porridge are more nutritious than inferior butchers' meat. In the table given beneath, is shown the comparative value of lean beef, dried flesh, and dried oat cake, and it will no doubt surprise, all who pity the oatmeal consuming Scotchman to learn that of our common kinds of meal the richest, both in gluten and fat, is that obtained from the oat!

TABLE.

	Lean Beef.	Dried flesh.	Dried Oat cake.
Water and blood.	78	0	0
Fibrin or Gluten.	19	84	21
Fat	3	7	7
Starch	0	0	70
Blood and Salts...	0	9	2
	100	100	100

" Here we have the two differences between the lean flesh of well fed animals, and the most nutritive of our cereals presented in a very striking light. The animal food contains four times as much of what for the moment we may call gluten; but it is wholly deficient in the other main ingredient of vegetables—the starch which in the dried oatmeal cake forms seven-tenths of the whole weight.*

The value of the oat as food for human beings, and especially for young children of both sexes, for youths and growing lads, being established, we may now enter on the subject of its cultivation. In India, the oat which is suited to climates too cold for wheat, or other grain crops, is at present and as a rule cultivated in localities where snow is unknown, and the frost is of the mildest form and very little, if any, attention is paid to the selection of the soil. Under these conditions, it is extremely doubtful whether a good crop of oats, which would find a purchaser in the London market, has ever been grown in Hindoostan. Under an Indian sky, the oat (of which an indigenous variety grows wild in the Himalayas north of Dehra,) may be properly called a cereal of the hills and highlands of this country, where it would grow to perfection, but its money value being unknown to the hill men and its dietetic value to the Commissariat Department, charged with the duty of rationing Her Majesty's troops, cantoned in the hills and plains, and no proper seed oats being available, the cultivation must in the first instance be taken in hand by European residents in the hills and also by all Tea and Coffee Planters, and the seed so obtained being judiciously distributed, ordinary oatmeal would cease to be sold at nine pence per pound cash (six annas) to the discomfiture of thousands of Scotch soldiers, to whom no greater treat could be offered than a good breakfast of porridge.

In Scotland, when land is broken up, either from a state of nature or from pasture, oats form the first crop, as they may be repeated for a series of years without injuring the soil.

The oat requires a soil, intermediate between light and heavy lands, the former term means

* See the " Chemistry of common life," Vol. I, pp. 128, 129. By Professor James F. W. Johnston.

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such as contain a large proportion of sand or gravel, the latter such as contain much clay.

The selected land should be well and deeply ploughed up in October (in the Himalayas, Sealkote, and Rawul Pindee) and after the seed has been sown, the land should be completely harrowed, and then rolled across the ridges, the usual native implements being used for the purpose. In the Madras, and Bombay Presidencies, the time of ploughing and sowing will have to be regulated according to their hill climates. In all Presidencies, if the object in view is to produce the greatest bulk of straw, sow 15, 30, or 45 days later: oat straw is preferred to any other as fodder for cattle as it is considered more nutritive. The grain obtained from the early sown oats, is of better quality than that obtained from subsequent sowings.

The quantity of seed necessary, varies, (in Scotland) from four to seven bushels per imperial acre of 4,840 square yards, and broadcast sowing is that generally practised.

The bushel of oats weighs 47½ pounds avoirdupois. The maximum quantity, soil and climate being favorable, may be estimated at seventy bushels per acre, the average being four quarters.

In addition to their value as a food grain, oats are peculiarly proper to be mixed with barley, rye, wheat and malt for the purposes of distillation. The husks of the oats diffused through the wheat flour and rye meal, keep it open or porous when mashed, and thus favor the abstraction of the wort, while the gluten of the wheat tends to convert the starch of the barley and oats into sugar. Experience has taught the Scotch distillers of whiskey, that pure malt is preferable for the ale and porter brewers, while the mixture affords a larger product at the same cost of materials to the distiller, who obtains from each boll of mixed grain, (weighing 291lbs.) fourteen imperial gallons of proof whiskey, on an average; equivalent to 11·2 gallons at 25 over proof. A consideration of all these matters will, it is hoped, induce landed proprietors in the hills, and the hilly districts of the plains to undertake the scientific cultivation of Oats. The seed oats of the Himalayas should as a rule be sown in suitable localities in the plains, say in the entire "Chota Nagpore" district and the imported seed oats, in the Himalayas, and other Indian mountain ranges and highlands.

As regards mineral manure for Oats, nitrate of potash, sulphate of lime (gypsum) or soda and phosphoric acid are indispensable. It is said that in the saltpetre districts of the plains the former is manufactured at a cost of Rupees 2 per maund of 82lbs. and as bones are abundantly procurable in every Hill Station for the mere cost of collection, the production of phosphoric acid in combination with lime is easily secured.

If bones of any description are calcined in an open pit, their gelantine or glue is burned out, and that which remains is called bone ash, or bone earth, and 100lbs. weight of this bone ash contains from 40 to 45 pounds of phosphoric acid. Saltpetre is composed of dry nitric acid, and potash; and as the bone ash contains lime, magnesia, and phosphoric acid, when they are mixed together in the dry pulvurent state and then well wetted (not drenched) with water chemical action takes place. The potash and phosphoric acid have a great chemical affinity for each other, combine and form the phosphate of potash, the nitric acid, lime, and magnesia in like manner act on each other producing their nitrates, and as the nitric acid present in saltpetre is composed of oxygen and nitrogen, the growing plants take it up by their roots, and in due time convert it into gluten, which is nearly identical with the fibrin of flesh. The principal mineral matter present in the flesh of a well fed man, ox, calf, pig, cow, and sheep, is the phosphate of potash. Hence it is evident that in order to keep up the supply, the nitrate of potash should as a rule be employed as a manure in conjunction with bone ash, which may at all times be prepared as follows, viz:—

BONE ASH: TO MAKE.

Dig a circular hole in the ground, 40 inches in diameter, and from 20 to 24 inches in depth. At its bottom, and on four stones or half bricks, place an iron grating, 12 inches square, made of bar iron, like the old gridirons of the past, only without feet, and handle. Next spread a layer of bones on the floor of the pit, three to five inches in depth, and on the bones lay a single layer of wood fuel cut into small billets: on the grating place as much charcoal as will cover it (one seer is ample) and then a layer of dry grass, roots, weeds, and anything in the stalk, stem, and twig line, which will burn over the coal and wood; on this log another layer of bones, and grass roots, &c., &c., then dry straw at the sides of the pit, as charged, to carry the fire downwards. The alternate layers of bones (just as gathered,) and wood-fuel to be continued until the pit is full, when a layer of small cut wood should be spread thereon, a six inch layer of bones on top and straw and weed roots over them. At or after dusk, light the pile in different places, and let it burn out, which will be done during the night. It will take two days to cool, and for the fire to be extinguished. The contents of the pit have now to be removed and stored. In addition to the calcined bones, there will be

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found charcoal grit and calcined earth, mixed with potash. The bones are to be separated, reduced to powder in an iron mortar, and put by for future use. The burned earth and ash to be stored in a covered pit, cask, or to be piled in an out-office. But if a manure pit is available, add the earth and ash to the animal manure.

By adopting this simple and inexpensive mode of manufacture, the dry months of each year might be regularly devoted to the preparation of bone ash, and when it is borne in mind that one ton (27 maunds) of "dissolved Peruvian Government Guano," costs Rupees 175, or Rupees 12-8 per bag of 160 lbs. or four pounds short of two maunds, and contains only 20 per cent of soluble, and 4 per cent of insoluble Guano Phosphate, associated with nitrogen equal to 10 per cent of non-volatile ammonia, the great superiority and cheapness of the bone ash and nitre manure becomes self-evident.

The fertilising matters present in the best Guanos are phosphate of lime and magnesia, or bone-earth derived from fish-bone. The nitrogen present is due to fœcal ammonia, and as this substance consists of nitrogen and hydrogen, it is manifest that saltpetre affords the prime element of ammonia in its most fixed and purest form.

According to Professor Johnston, fourteen lbs. of nitrogen and three lbs. of hydrogen, make seventeen pounds of ammonia.

The nitric acid present in saltpetre contains nitrogen and oxygen. For 14lbs. of nitrogen and 40lbs. of oxygen produce 54lbs. of nitric acid. Hence the dry nitric acid present in saltpetre supplies the same quantity of nitrogen, and a very considerable quantity of oxygen in addition. Guano contains no potash, saltpetre an abundant supply as shown beneath.

Components of Nitrate of Potash or Saltpetre.

Base.	Acid.		Formulæ.
47·15	54·15.	One Equivalent-1015·3.	KO.PNO.

If we multiply the quantities given by 6,000. The base or potash is represented by grains 28,290·00 and the dry nitric acid by grains, 324900·00.

Then grains 282,900 divided by 900-chittacks equals 314½ divided by 16 seers. 19, 10½ chts.

Then grains 324,900 divided by 900-chittacks equals 361 divided by 16 seers 22. 9.

Total Seers... 42. 3½ chts.

Now this teaches us that forty-two seers and four chittacks of saltpetre, which may be purchased for six Rupees, contain over nineteen seers of potash and twenty-two of nitric acid, and as the one hundred and sixty lbs. of Guano, at Rupees 12-8 per bag is destitute of potash, and very moderately supplied with ammonia or what comes to the same thing its elements, the one cannot hold a candle to the other, for 100 pounds of saltpetre enriched with 300 of bone-ash powder, produce 400lbs. of absolute fertilizing matter, whilst 100 pounds of Peruvian Guano contain only 34 per cent, the difference 64 per cent being apparently of no value.—*Idem*, p. 122.

TUSSER SILK.

Early in 1875, Mr. Wardle, a silk-dyer of considerable practical skill in England, communicated to the Secretary of State for India that, after experiments carried on for several years with varying results, he had at last discovered a process by which he could successfully dye *tusser* silk in brilliant colors, as also impart to it the lustre of the Chinese silk. But he thought that, if the indigenous silk industry were to be improved by the introduction of his process into India, the application of native dye-stuffs to the native silks would be attended with many economic advantages besides other more important advantages from an artistic point of view. Mr. Wardle also inclined to the opinion that the *moogah* and other wild silks are equally susceptible of improvement. If such be the case, the yield of these wild silks may be considered to be practically inexhaustible. But the chief drawback to an almost unlimited demand for them is the form in which they are prepared for the market. It has been suggested that the cocoons should, before they are manipulated, be steeped in more or less strong solutions of potash or caustic soda to dissolve the peculiar gum the insect secretes while spinning and that the silk should be reeled off into skeins, instead of into hanks, as at present.

As the proper preparation of these wild silks might under favorable conditions become a great and profitable industry in India, we purpose placing before our readers such information, as is available, regarding the insect, which produces the Tusser-silk, the manner in which it is reared and the processes by which the silk is obtained. We shall also from time to time give in other parts of this journal some account of the indigenous dye stuffs, commonly to be met with in different parts of India.

Among the moths, which produce the wild silk of India, the *Tusser* is the most important and most widely distributed; and, though generally identified with the *Antheræa paphia*, it has been shown by Captain Hutton to consist of several species, which go under the name of *Tusser* and are to be found in the sub-Himalayan Tracts, almost throughout the extent of the range; through the hills from Assam to Chittagong; in the Sunderbuns; in the great belt of hill and forest inhabited by the Sonthal, the

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Kol, the Khond and the Gond; in the Western ghats; in parts of the Madras Presidency; in British Burmah and in Ceylon. The worm is multivoltine; but it has not been definitely ascertained how many times in the year it goes through its transformations or whether its periods of existence may not vary according to conditions of climate. It feeds variously on the *ber* (*Zizyphus jujuba*) the country almond, (*Terminalia catapha*) the *seemul*, (*Bombax heptaphyllum*) the *asun* (*Terminalia alata*) the *saj*, (*T. tomentosa*) the *sal*, (*Shorea robusta*) and other trees. A wild worm, which spins large cocoons, is to be found in the jungles of Coorg, feeding on the Indian caoutchouc, (*Ficus elastica*) the poplar-leaved fig, (*Ficus religiosa*) and the Indian Gutta-percha tree (*Isonandra acuminata*); and if it be a *tusser*, it would appear to feed on a greater variety of leaves than is generally supposed. Another wild worm, which feeds on the camel-thorn, is said to occur in the Salt Range in the Punjab.

This Tusser worm is incorrectly supposed to be of a species that cannot be domesticated and is said to be traced by the hill-people upon the *ber* and *asun* trees, by their excrement beneath. The branches on which the worms are settled are cut off and carried away; and the worms themselves are then distributed on the same species of trees in the vicinity of their homesteads. These worms cannot be retained for seed.

The moth has been reared for more than half a century in all the western forests from Ramghur (now Hazareebaugh) to Midnapore, the cocoon (or vernacularly *gootee*) being of three qualities "mooga, teera and bunbunda." The *mooga* is the most common and plentiful; and its thread, though coarse, winds easily: the *teera* is a smaller cocoon, "said to be the male of the *mooga*;" and its thread is finer, but not so easily wound; and the *bunbunda*, which, as its name indicates, is found in its natural state in forests, attains a greater size than the *mooga* from feeding more freely: it is scarce, and its thread, which is coarser, runs easily.

Dr. Buchanan describes the rearing of the *Tusser* and the winding of the silk in Bhaugulpore, which is the centre of the industry in this description of silk, very minutely and fully; and we shall offer no excuse for making the following extract from his book. "The chief use to which the tree (*terminalia alata*) is, however, applied, is to rear the tusser silk, of which I shall here give some account.

The tree abounds chiefly in the part of the district that is situated east from the Chandar, and between that and the Rajmahal hills, and there occupies as large a space as the bamboo does towards the west. The animal is reared by all castes who inhabit these parts, but in general by the armed men employed under *ghatwals* to preserve the peace of the country. With a view, perhaps, of securing the employment to themselves they have established certain rules of purity, as they call it, which they allege are absolutely necessary, and they affirm that any infringement would totally destroy the insect. Women, who are best fitted for such a work, are entirely excluded from it, as totally impure, nor are they permitted to approach the place; and while employed in this work, the men totally abstain from the company of their wives. Again, most of the low, vile castes are excluded by their appetites, abandoned to the gross impurity of animal food. The breeders eat sparingly once a day of rice, cleaned without boiling, and seasoned only with vegetables. They are considered also to preserve their purity by never employing the washerman or barber.

Concerning the method of procuring the seed cocoons, I found in the accounts of the natives the utmost difference. In Bangha it was stated that the only good seed was procured from the forests, from whence the spontaneous cocoons were brought by people of wild tribes, were purchased by merchants, and distributed among those who rear the worms. From these cocoons three successive broods are reared, but those reared from the wild cocoons (*dhaba*) are the best; the other, *sarihan*, *jarhan* and *langga*, gradually degenerate. At Tarapur and Lakardewarie it was stated that the kinds are quite distinct, that the good tusser (*dhaba*) is always reared from cultivated cocoons, some of which are preserved through the year for propagating the breed; and that the wild cocoons are only used for this purpose when, from accident and carelessness, the proper seed is lost; and the tusser which these give is always of an inferior quality, but is of two kinds, *sarihan* and *langga*, the last of which is very inferior, and is seldom employed. Each kind, according to these people, breeds twice in the year.

In Fyezullahgunj, again it was said, as in Bangha, that no seed was preserved through the year; that in the beginning of the season wild cocoons were procured, but that the silk which these gave was of inferior value, and that the cocoons of this brood were chiefly preserved for producing a second, of which the silk was of the best kind. These accounts are in direct opposition to each other; nor can we take upon ourselves to assert which is true, or whether any of them is false, although we are inclined to rely most on the account given in Lakardewani and Tarapeer; but it may happen that such different practices really prevailed, and that the influence of them on the quality of the silk is quite imaginary, for we would observe that at Bhagulpore all the cocoons are usually sold indiscriminately as of the same value, and very often intermixed. The weavers, indeed, say that there is a difference in the

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quality of cocoons, and that one kind (*dhaba*) is more easily wound, and gives a larger quantity of silk, while the *sarihan* produces one-fourth less, but is of a better quality. The merchants who deal with the simple breeders endeavour, probably, to keep up distinctions, of which they avail themselves. They pay in advance for the whole, and give a very low price; but they no doubt are often defrauded by people who never fulfil their engagements.

Among other ridiculous imaginations concerning the insects, propagated, as I suppose, to impress the people with an idea of their purity, it is supposed that a tusser female moth will not admit the embraces of a male of the same paternal family with herself. The breeders, however, very judiciously leave the whole adjustment of this delicate point to the discretion of the females. The seed cocoons are placed on a large flat basket; and when the moths burst the cocoons, they are allowed to form such connections as they please. In from 15 to 20 hours afterwards the males are thrown away, and from 20 to 25 impregnated females are placed in a cylindrical basket with a narrow mouth which is covered with leaves, and some leaves are laid on the bottom of the basket. In some places an earthern pot is preferred. On these leaves, in the course of the day, the females deposit their eggs, and are then thrown away, and the eggs are placed in small baskets made of the *bhela* leaves. On the ninth day afterwards the eggs are hatched, and baskets on which they are lying are put upon a tree, over the leaves of which the young insects immediately spread. When they have consumed these, the worms are removed to other trees, and in 36 days from being hatched they begin to spin. In 15 days this operation is completed, when all the young branches are cut, and the cocoons are thus collected with very little trouble. The only operation at all troublesome is the removing the worms from one tree to another and this might probably be avoided by putting no more at first on each tree than it should be able to maintain. The worms, however, must be watched, as crows and other birds and hornets are apt to destroy them. The whole space of time occupied by the two crops may be about five months, beginning about the 1st of July, and ending about the last of November. A great number of the cocoons preserved for seed burst, and these can only be sold for about half price. Those originally intended for sale are killed by being put in boiling water, and then dried in the sun.

"In procuring food for these worms, the only trouble is to select a piece of ground on which the *assan* tree grows, intermixed with few others. These latter and all bushes ought to be removed, and all the large branches of the *assan* tree should be lopped near the stem, and young shoots permitted to grow, for those produce large succulent leaves fit for the worm. The worms are only applied to the same tree once in two years, a whole year being necessary to allow the new shoots to grow.

"A woman takes five pans of cocoons (405), and puts them in a large earthen pot with 600 sicca weight of water, a small mat being placed in the bottom to prevent the cocoons from being burned. A small quantity of potash, tied in a bit of cloth, is put into the pot along with the cocoons, which are boiled about an European hour. They are then cooled, the water is changed, and they are again boiled. The water is poured off and the cocoons are put into another pot, where they stand three days in the sun covered with a cloth to exclude insects.

On the fourth day they are again boiled, with 200 sicca weight of water, for rather less than an hour, and then poured into a basket, where they are allowed to cool, after which they are washed in cold water, and placed to dry on a layer of cow-dung ashes, where they remain spread and covered with a cloth for six hours. The woman then picks out such cocoons as are not quite ready for winding, and exposes them for a day to the sun, which completes the operation. The outer filaments of the cocoon are then picked off, and form a substance called *jhuri* of which the potters make brushes used for applying a pigment to their vessels. The fibres from four to five cocoons are then wound off on a miserable conical reel, which is twirled round by one hand; while the thread is twisted on the thigh, the cocoons adjusted, and the broken fibres joined by the other. The cocoons, while winding, are not placed in water. This thread is called *lak;* and after the *lak* has been removed, there remains another inferior kind of filament, called also *jhuri*, which is wound off, and is purchased by those who knit strings. Even the cocoons that have been burst by the moth are wound off; but, owing to the frequent joinings, give a weaker silk. When the tusser is neither very high nor very low, that is, when 405 cocoons cost a Rupee at Bhagulpore, a woman boils and winds the number in ten days. At this rate she would wind 1,215 cocoons in the month; these would yield 2,257 lbs. of fine thread, worth 5 Rupees 6 annas, and 1½ annas worth of refuse (*jhuri*); but the cost of pots, firewood, &c., reduce the profit from Re. 1-8 to Re. 1-12 per mensem."

In the Soonderbuns the cocoons are found on the *Khoura* or wild plum tree—each female lays about 150 eggs of a reddish color; these eggs take from 9 to 14 days to hatch. The young worms are speedily removed to the tree, where they feed freely till they become 3 or 4 inches long and of a brilliant green color, marked with golden spots—spinning where they feed. The

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period from hatching to completion of cocoons is about fifty days. The cocoons realise a price of Rs. 3 to 5 per *kahan*—16 multiplied by 80 equals 1,280. If of good quality, a quarter of a *kahan* yields enough silk for the manufacture of a pair of *dhootees*, which sell for Rs. 4 to 5. The rearers squat on the edge of a jungle—the Zemindar levying a cess of one Rupee per party. The profits of their occupation for upwards of two months vary from Rupees 30 to 10; and during the whole time, according to some superstitious notions prevalent among them, they submit to restraints, such as abstaining from fish diet, from anointing their bodies with oil and from mentioning the names of certain things which are considered unclean.

In the Palamow sub-division of the Lohardugga district in the Chota Nagpore Province, the mode of rearing the *Tusser* silk-worm is described as follows:—

"The worms are fed on the assan or *terminalia tomentosa* the moths emerge about the middle of June; the males are small, with a large red dot on each wing; those of the other sex much larger, fuller made in the body, particularly the hinder parts. Some two or three hours after the moths have burst out of the cocoons they are mated for a half-hour; the males are then shut in a basket, and the females have their wings tied close to the shoulder, and put on a board or bamboo flooring, when they immediately commence laying. The wings are tied to prevent them flying away. The next day the eggs are collected from under them, and a few of their wings plucked, and gently rubbed in the hand to a powder. The eggs are put in this powder, and shaken till they separate. It is then put into a thin piece of cloth, tied and put carefully away, so that the ants do not get at them. This is continued daily, each moth laying for three or four days, when from exhaustion she dies. * * *

On the eighth day the eggs are hatched, and the worms immediately taken to the jungle, and a nest formed on the tree by tying together a lot of growing leaves into the shape of a cup, in which the worms are placed.

In four days they are an inch long, and are removed to other trees, and as they grow larger, are from time to time diffused over a large number of trees. * * * Boys are employed in scaring the birds. * * * The worms grow to the size of five or six inches long and one thick, when they commence to spin. After formation into cocoons they are allowed to remain a week on the trees to harden them, taken down, attached to small twigs, and daily laid out in the air to dry. From the time the worms are put to the trees and the cocoons taken down occupies a month and a half or till the end of July. A second crop commences about the latter end of August or beginning of September, and the yield is more full and larger. Purchasers come from Patna, Daoodnugger, and other large towns, buying cocoons at Rupees 3 to Rupees 6 per thousand of 1,100—1,300. The burst cocoons also find a ready market at Rupees 2-8 to Rupees 3 per thousand for June and July produce, and Rupees 4 for the October produce. The revenue or *malguzari* for a silk field is Rupees 3 for each cutter or full grown man, who is expected to take the cocoons down; at an average there are three of these to a good sized field covering some 30 beegahs of land."

Mr. Charles Blechynden, Superintendent of the Radnagore Silk Factories gives the following account of tusser in the Midnapore district:

"Cocoons for seed are purchased in the months of *Paus* (December) and *Maug* (January) at 15 or 16 *gundas* per Rupee, they are hung in a pot for 4 months or till about the 13th *Bysack* (April) when some of the moths come out of the cocoons and are removed into another pot and kept there for a fortnight, during this period eggs are laid.

"These eggs are now put into *sal* leaf boxes for four days, at the end of which time they begin to hatch and are placed on clumps of either assan or *sal* branches. After two or three days, the worms growing stronger, no very great care is requisite, save to remove them from one branch to another when they have eaten all the leaves of that which they are on; this is effected by cutting down the branch and placing it against another. In three weeks these worms weigh two *chittacks* each; they cast their skins three times, after which they spin and are brought home, when they undergo boiling and are after that fit for sale." The seasons for collecting the cocoons for silk are May and July of each year. The price of the cocoons is never fixed, one *kahan* selling for Rupees 3-8-0 generally and sometimes even as high as Rupees 4-8-0. The cocoons are boiled in cow-dung and water and the thread is drawn out on a hand-reel.—*Idem*, p. 128.

(To be continued.)

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